OCTOBER 30, 1950

American Machinist

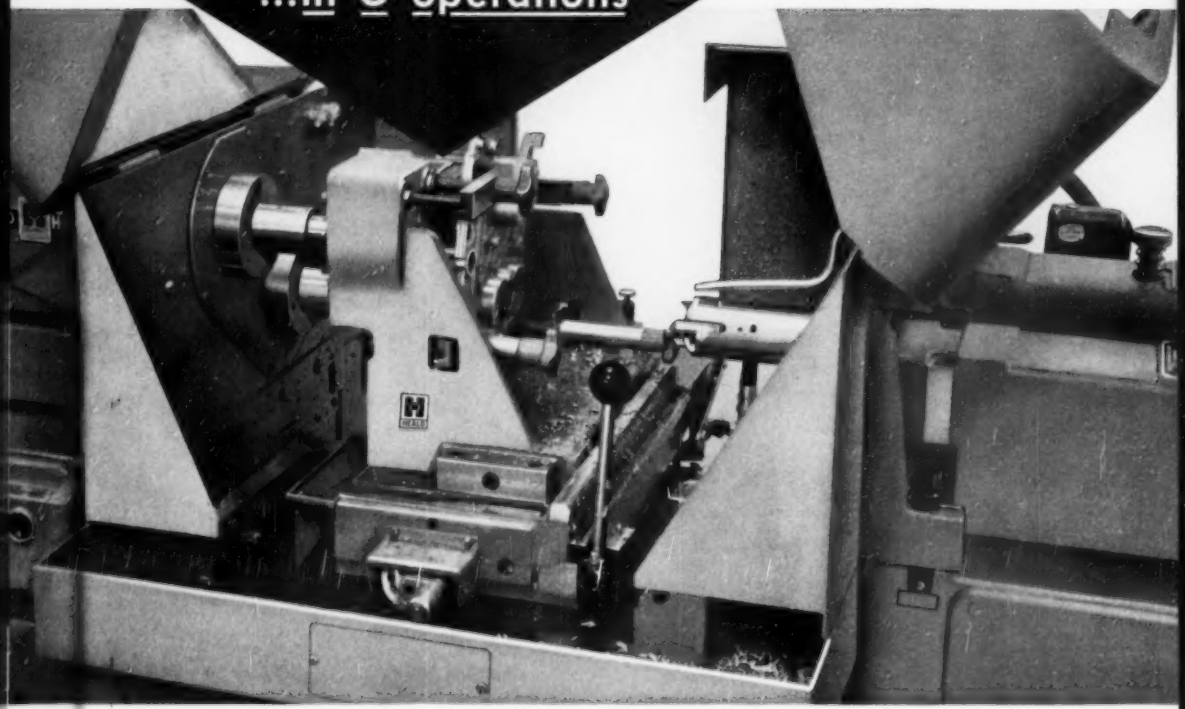
McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

Hf welding a turbine diaphragm — see page 4

HOW TO MAKE ARMAMENT

24 surfaces borized ...in 3 operations

bore 8
face 7
chamfer 4
drill 3
form 2 radii



That's how a versatile Heald Bore-Matic helps Sound Scriber Corp. speed production of the new TYCOON dictating equipment

With this last word dictating equipment, precision finishing contributes much to lasting, high-quality performance. And the new Heald Model 122 Bore-Matic used contributes to high-speed production at lowest possible cost, too.

An interesting example of Heald versatility, this one machine borizes *24 different surfaces*, in three operations. It is used to finish TYCOON dictating machine motor boards — to bore 8 surfaces, face 7, chamfer 4, drill 3 and form 2 radii. The work is held in a box-type fixture, which tilts 90°, arranged to present the required surfaces to the two sets of boringheads in the proper sequence to perform the various operations.

Whatever your job — simple or complex, large work or small — there's a Heald machine that can help you increase production and cut costs. Remember — when it comes to precision finishing, it pays to come to Heald.

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

HEALD

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

Upper picture is of Lathe and Tool Departments. Lower view taken in Milling Department. Cranes are hand-propelled with electric hoist.

OVERHEAD CRANES

Speed Production of MONARCH LATHES

As one of the foremost lathe builders with a modern plant and reputation for efficient operation, it is interesting to note the extent to which The Monarch Machine Tool Co., Sidney, Ohio, makes use of Cleveland Tramrail overhead cranes.

In every direction through the many departments, one sees the familiar arched beams of Cleveland Tramrail cranes and runways. In constant use, they handle parts to be machined, aid in fitting and assembly operations, move completed lathes and do a host of other work.

The cranes make the handling of materials easy and safe. They speed production because the skilled machine operators can move the heavy parts in and out of the machine tools quickly without help. As one or several cranes are provided in each bay according to the need, there is no lost time waiting for use of a crane.

If you are interested in ways of improving plant efficiency you will be interested in Cleveland Tramrail.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1416 East 284th Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

BROACHES and BROACHING FIXTURES

that's all we make!

Complete Broach Service

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Our estimating and design engineers will analyze your broaching jobs, present or proposed, and give you actual cost and production data on new tooling . . . you know your savings beforehand.

MANUFACTURING

Every size and type of broach is manufactured in our modern plant. Highest standards of quality are assured through specialized equipment and processes from roughing operations through final inspection.

SERVICE

Detroit Broach field engineers are prompt to give you help when needed on broaching jobs in your plant. We also will setup and tryout your new broach tooling . . . thus assuring most efficient production.

DETROIT *Broach* COMPANY

WORLD'S LARGEST MANUFACTURER OF

BROACHES AND BROACH TOOLING EXCLUSIVELY

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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Chips and Quips

High Frequency . . . Welding a complete turbine diaphragm on a semi-automatic machine is shown on our cover Kodachrome. The submerged-arc process uses powdered flux to minimize oxidation and maintain uniformity of the joint at De Laval Steam Turbine Company's Trenton, N. J., plant.

Armament . . . When the first defense program started back in 1940, *American Machinist* began its series of widely read Armament Sections, which covered all phases of production for war. To tie in with the current industrial expansion of defense-production facilities and retooling for manufacture of ordnance equipment, we present a complete index of these Armament Sections, including all other articles on the subject from 1938 to the present date. Techniques, tools, jigs, fixtures, plans, and engineering are split up for ready reference, and each indexed article is marked for the kind of armament it covers—aircraft, ships, vehicles, or weapons. If you have a file of *American Machinist* handy or at a local library, you can quickly find critical information.

The how-to-do-it part of rearming for defense is carried on with a story by Associate Editor Rupert LeGrand on Detroit Arsenal, covering the strip-down job being done on wartime M-4 tanks. These are cut away at the rear to make room for new Continental engines of higher power, and are welded up with new armor plate on giant fixtures that turn a complete tank on its back. After refitting, the armadillo-like craft come out of the plant as General Patton tanks.

Trimming Dies . . . Improvements in functional efficiency, as well as in appearance and accuracy, can be made on shells when they are trimmed after drawing. A 4-page article by J. R. Paquin illustrates 17 ways to do this with 17 different tools.

Coming . . . Nov. 13 *AM* will be a surpriser. Regular features will include New Equipment and rear-of-book departments, but the rest of the issue will be concerned with disaster control—as you'll be able to see easily by the special cover. What to do in case of atom bombing has been discussed widely; but specific recommendations on what to do for and in your industrial plant haven't appeared anywhere. Fire, flood, radiation, blast, and detailed damage to machines and plant are covered, and we are outlining what you can do beforehand, when the sirens sound, when the bomb hits, and when the blast is over to protect life, property, and your production schedule. As Britain found out in the last war, bombing is a bad business; but alert management and leadership, imaginative preventive measures, and good organization of clean-up squads can do wonders to keep even an almost-leveled factory running full blast.

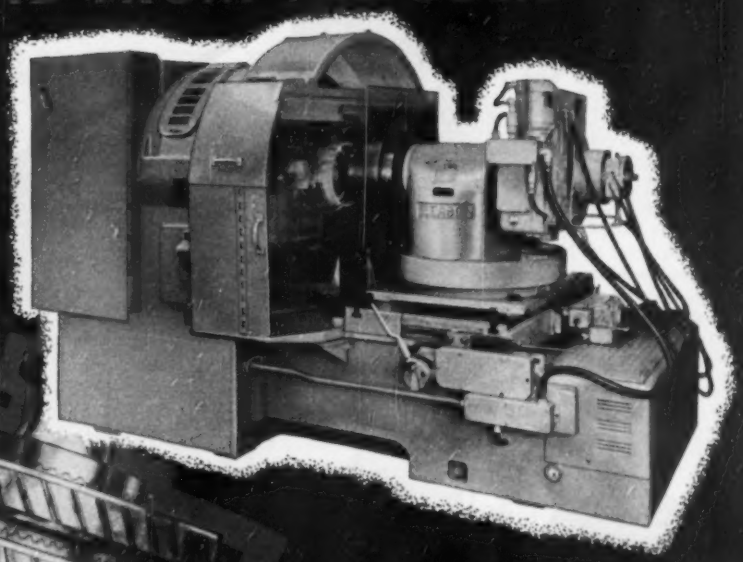
Blasted Chips . . . A 3-page article from Chicago Screw Company shows how crushed chips in three different materials—salvaged from metalcutting operations—are kept separate with a venturi-pneumatic handling system. Scrap that is crushed and dried brings a better price, and oil can be reused.

The Big Bore . . . Cutting the bore in cast, alloy-steel connecting rods for stationary diesel engines used to take 12½ hr. each. The rods are 5 ft. tall, and weigh 1600 lb. But a new boring method cuts time to 61 minutes, and made a capital expenditure (for tooling) of $100,000 economical for Cooper-Bessemer Corp. A 2-pager explains it.

Shorts . . . Smaller articles cover such subjects as: how to figure draw-ring pressure for single-action presses (RBS); a two-dimensional grinder at the University of Washington that substitutes for a $15,000 machine; a feed-tube indexing fixture added to a screw machine at Clary Multiplier Corp. to increase output of a long-bar job 75%; a half-page of Short Cuts.

CARBURIZER . . . T. A. Frischmon, who's writing current series on the right way to carburize, is well-qualified to publish his ideas on the subject. He graduated from Case Institute in 1925 with a degree in metallurgy, and has been in the field ever since. He worked in National Tube Company's metallurgical department, was assistant metallurgist at Eastern Rolling Mill Company, was staff metallurgist for Timken Roller Bearing Company, and finally became chief metallurgist of Eaton Mfg. Co's Axle Division in 1937, specializing in practical aspects and processing of gears and automotive parts. Aside from belonging to ASM, ASTE, and SAE, he has many articles in technical magazines to his credit, and is now working on a book about industrial metallurgy for McGraw-Hill Book Co. The second installment of his carburization series appears in this issue.

INTERCHANGEABLE COUPLINGS
GROUND FROM THE SOLID



• The Gleason No. 19 Curvic Coupling Grinder produces ground Curvic and Zerol face couplings automatically with a uniformity of machining which makes each part interchangeable. Replacement costs of large units can be materially reduced by using built-up units employing the principle of the permanent couplings.

The Gleason No. 19 Curvic Coupling Grinder with its automatic cycle control insures precision operation while the automatic dressing operation provides larger grinding wheel and diamond life.

GLEASON
Works
1000 University Avenue
Rochester 3, N. Y., U. S. A.

Aid to Production

Large, heavy castings add no effort whatever to manual control of the table. As far as the operator is concerned, the weight of the casting and fixture could be zero. In two setups and with the aid of CINCINNATI Quick Change Collets, 18 surfaces are milled on two sides of vertical head castings in about 450 minutes total time. The machine is a CINCINNATI 28" x 120" Vertical Hydro-Tel with raised rear base to accommodate 44" vertical capacity.

REPLACE WITH A *NEW* CINCINNATI

CINCINNATI

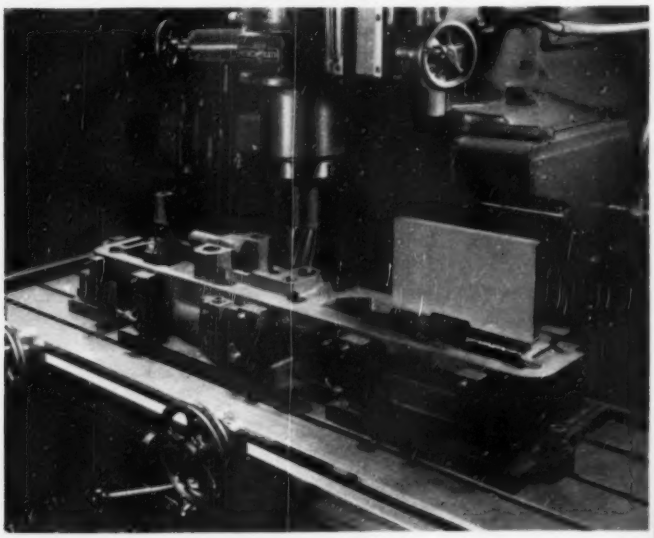
CIN

# of large parts...

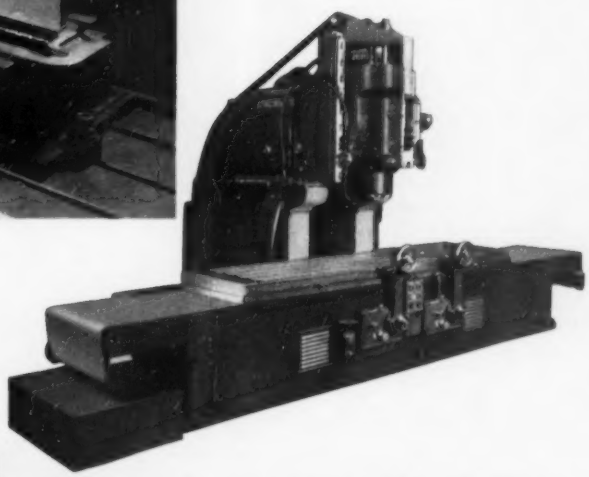
HYDRO-TEL'S FLEXIBILITY AND EASE OF OPERATION

If you had enough helpers, you could quickly push a piano around your living room with one finger. That's just about the advantage gained through manual controls of easy-to-operate Hydro-Tel Milling Machines. **And it's a very worth-while consideration for your replacement program.** ¶ Hydro-Tel's flexibility and ease of operation aid production of small lots in this manner: the flick of a lever whips the table to position, and a second lever operates the cross slide just as quickly. Each lever controls rapid traverse and feed rates in both directions; they can be operated in unison or independently. No time need be lost in positioning the work and cutter. If the job requires manual traverse of table and cross slide, it can be accomplished with practically no effort, for hydraulic power does the work while the operator rotates a handwheel. Other factors being equal, easy operation and flexibility definitely increase production. Operators like the Hydro-Tel, too, so give your operators and production a break by replacing your outdated milling machines with CINCINNATI Hydro-Tels.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



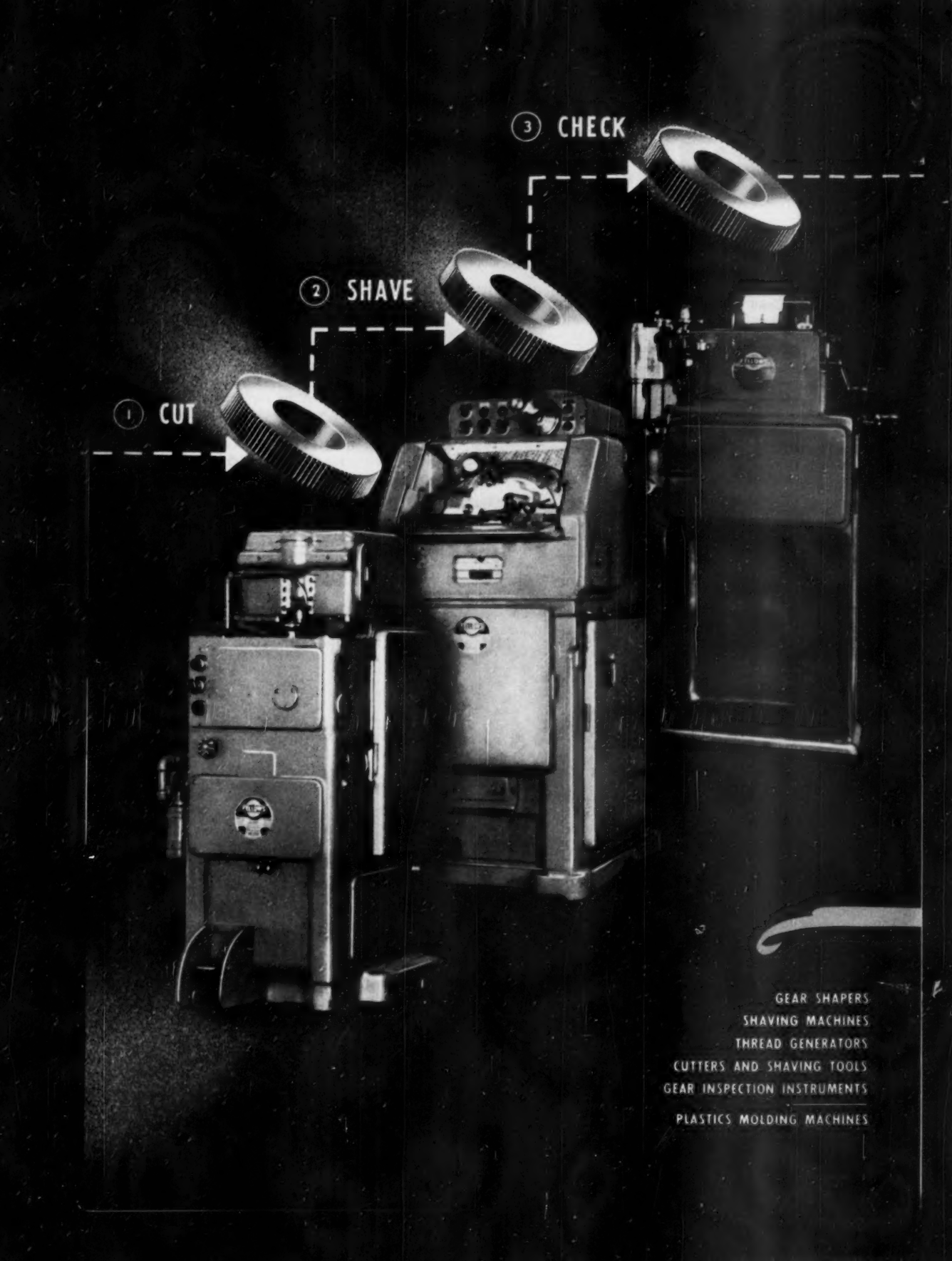
Hydro-Tel milling saves 254 minutes per casting. A multitude of milling operations on the hydraulic unit casting in the illustration formerly required a total of 572 minutes. When the job was assigned to a CINCINNATI 28" Vertical Hydro-Tel, tooled up for small lots, total milling time dropped to 318 minutes, due primarily to Hydro-Tel's exceptional flexibility and ease of operation.



CINCINNATI 28" Vertical Hydro-Tel Milling Machine. Complete specifications may be obtained by writing for catalog No. M-1284-3.

CINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID



GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

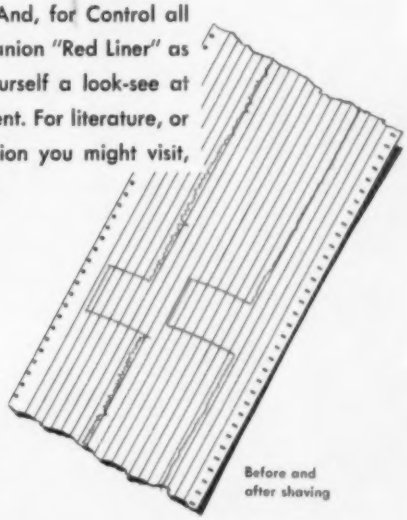
How to Make SMALL GEARS Good ...AND FAST!

Quality is a matter of tooth form and overall gear accuracy for which the Fellows method has always set the highest production standards.... **Speed,** too, finds Fellows in a leadership position. With cutter speeds up to 3,000 strokes per minute, the 3-inch Fine-Pitch Gear Shaper is in a class by itself. With Magazine Loading, small gears and pinions are cut at phenomenal rates....Where Shaving is required the No. 4 Fine-Pitch Gear Shaving Machine balances out as an effective running mate. And, for Control all along the line there's the companion "Red Liner" as illustrated here....You owe yourself a look-see at the latest in cost saving equipment. For literature, or reference to a nearby installation you might visit, write the nearest Fellows office.

1 Fellows Fine-Pitch Gear Shaper for gears from 1/16 in. to 3 inches pitch diameter. Thin blanks can be ganged to ¾ inch total face width. Magazine feed for small pinions. Cuts spur and helical, external and internal gears.

2 Fellows No. 4 Fine-Pitch Gear Shaving Machine for high-speed finishing of small spur or helical gears. Electrical control for automatic time cycling.

3 Fellows "Red Liner" for charted inspection records of all errors in combination, with inaccuracies magnified 200 times. Chart analysis identifies and measures different errors.



Before and after shaving

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont.
Branch Offices: 616 Fisher Bldg., Detroit 2 • 640 West Town Office Bldg., Chicago 12 • 2206 Empire State Bldg., New York 1.

VAN NORMAN

"It pays to Van Normanize"

RAM TYPE MILLERS

Meet Fluctuating Milling Requirements

The advantage of Van Norman Ram Type Millers is their versatility to meet the daily fluctuating milling requirements in the toolroom, machine shop, experimental laboratory, and pattern shop — by enabling operators to perform horizontal, angular, or vertical milling using conventional milling practice and standard arbors and cutters . . . all with one machine.

The adjustable cutterhead, which is mounted on a movable ram, permits milling at any angle from horizontal to vertical without changing the work setup. This means that most jobs can be carried through to completion in the original setup. The result: idle operator and machine time is cut by as much as 50% since there is no waiting for single purpose machines . . . no moving of work from one machine to another . . . errors that usually occur in changing setup are eliminated because the work setup is not disturbed.

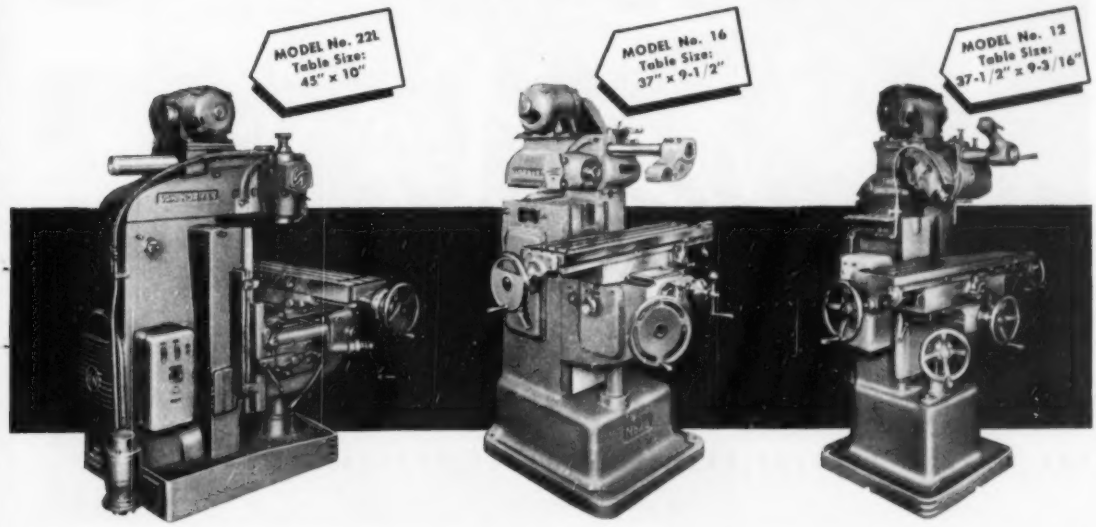
The versatility of ram-type millers to meet daily milling needs is also important in those plants and departments where milling requirements continually change. For example — one period calls for all horizontal milling, the next vertical or angular, or some horizontal, some vertical, etc. With ram-type millers operators simply position adjustable cutterheads, set up the work, and proceed with the milling job.

Ram-type millers enable you to meet all milling jobs . . . keep all operators and machines working. They cut costs, improve accuracy, and increase production.

Write for information and catalog describing Van Norman Ram Type Millers.

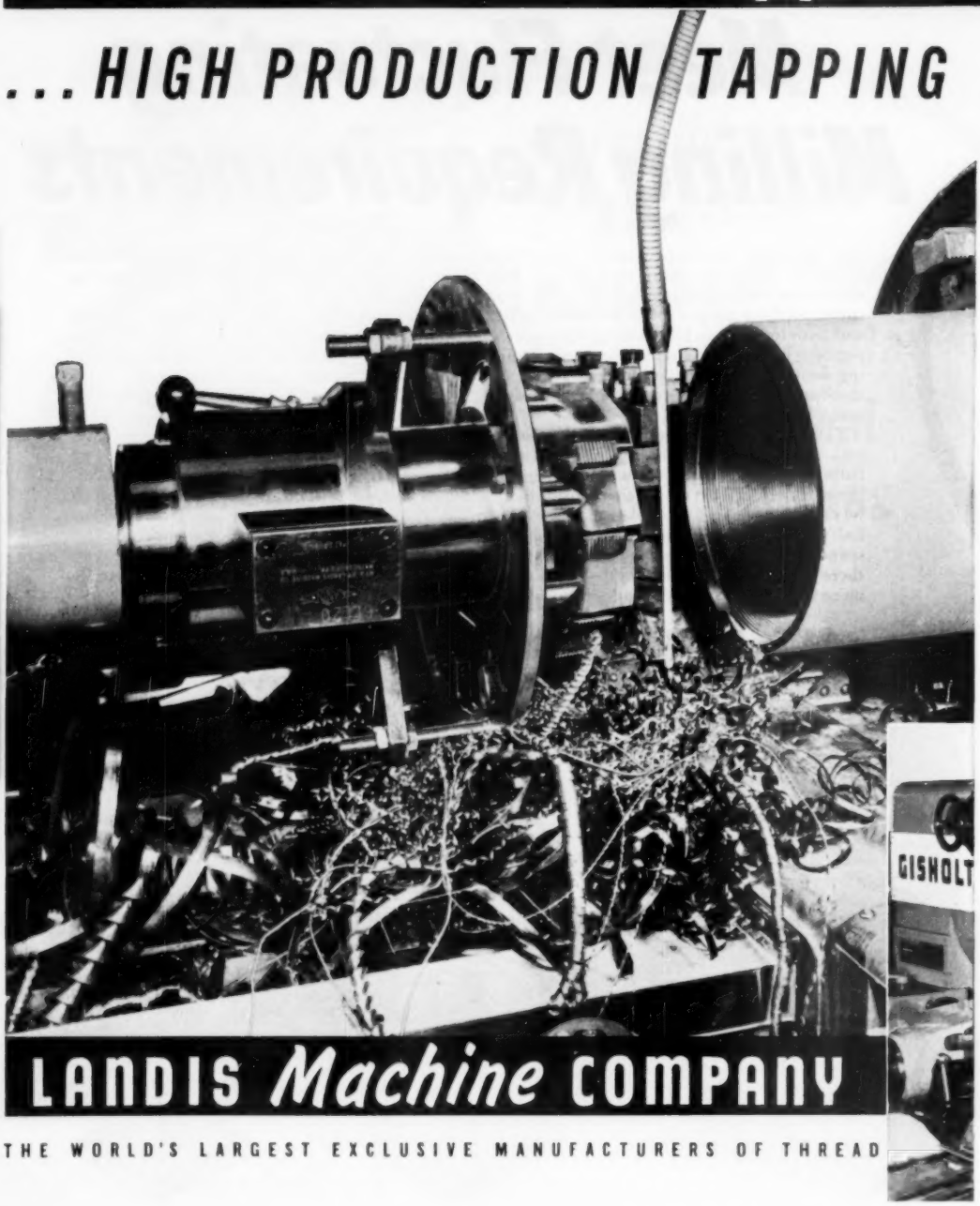
VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS



Internal Threads Tapped

...HIGH PRODUCTION TAPPING



LANDIS *Machine* COMPANY

THE WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF THREAD

to A. P. I. Tolerances . . .

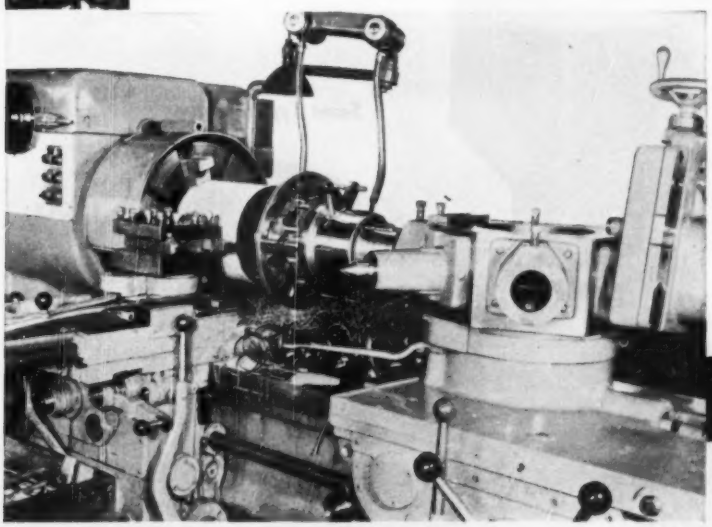
STANDS RIGID "100% INSPECTION"

Casing couplings are subjected to enormous strains created by the weight of the suspended casing, as well as to tremendous internal and external pressures. For these reasons they require threads of extreme accuracy. Thus the prime consideration in the selection of equipment for the production of these threads is that it produce A.P.I. threads at economical production rates.

The operation shown here is one of many where internal tapered threads are cut to A.P.I. tolerances at high production rates by Landis LL Receding Collapsible Taps. 8 pitch round form threads are cut in Grade N80 casing couplings 10¾" in diameter to a length of 4" with a ¾" taper. Production is high—averaging consistently about 17 surface feet per minute. A.P.I. tolerances are met without difficulty.

Landis LL Receding Collapsible Taps are designed and built for this type of work. The receding mechanism causes the chasers to recede into the tap head automatically at a rate equal to the taper of the thread being cut. When the thread is completed the chasers collapse into the tap head, and the tap is withdrawn.

Each tap has a wide range of cutting diameters since the tap heads are detachable and interchangeable. For example, if furnished with appropriate heads, the 6LL Tap Body, shown here equipped with a 10" ALM Tap Head will cut threads in all pipe sizes ranging from 6" to 12" inclusive. The Style LL Tap Body is made in four sizes to cover a range of nominal pipe sizes from 1" to 12" inclusive.



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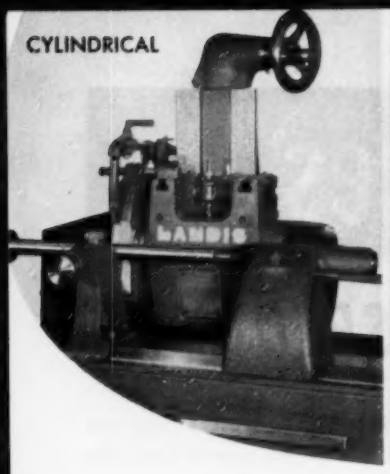
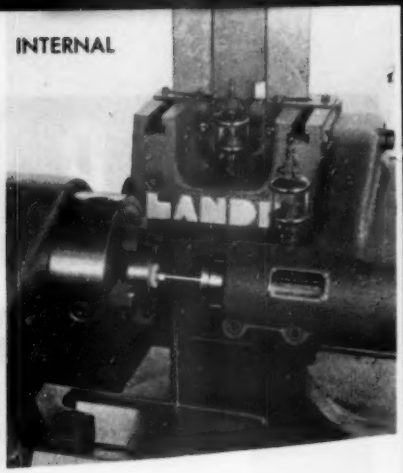
LANDIS STYLE LL RECEDING COLLAPSIBLE TAP

WAYNESBORO PENNA., U. S. A.

GENERATING EQUIPMENT





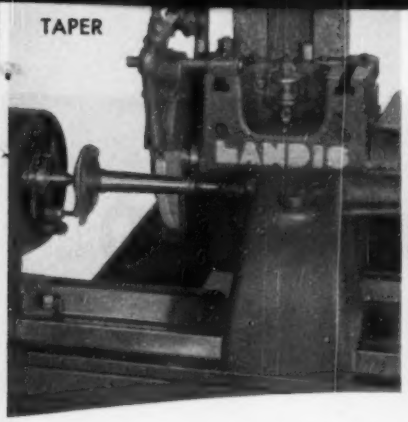
24 DIFFERENT

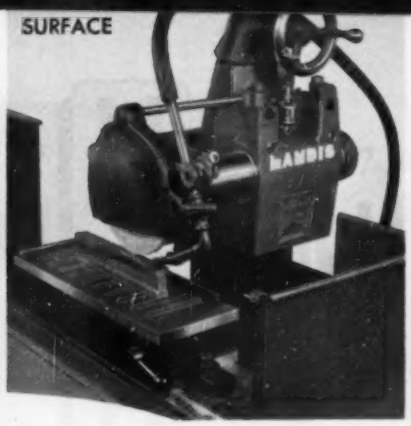
12" x 28" Universal and Tool

24-page catalog K45 gives full information and specifications of standard equipment and optional extra accessories for tool room and small shop work.

Some Typical Setups

LANDIS TOOL
Precision Grinders





GRINDING OPERATIONS

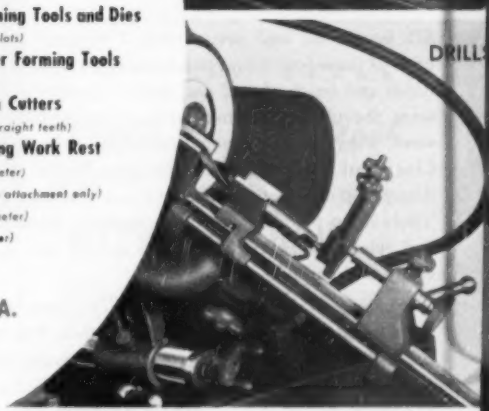
with versatile LANDIS TOOL 12" x 28" universal and tool grinder

With Standard Equipment

1. Cylindrical
2. Taper
3. Face
4. Surface *(operations without attachments only)*
5. Clearance on Saws, Cutters and Reamers
6. Flutes on Taps
7. Face of Teeth on Formed Cutters
8. Spiral Mill Grinding

With Optional Accessory Equipment

9. Milling Cutters
10. Wet Grinding
11. Dry Grinding
12. Internal Grinding
13. Hobs *(right or left hand)*
14. Parallel Blocks, Flat Forming Tools and Dies
15. Surface Grinding *(quantity lots)*
16. Screw Machine and Other Forming Tools
17. Angular Wheel Face
18. Reamers, Taps and Form Cutters
19. Gear Cutter *(staggered or straight teeth)*
20. Cylindrical Work Requiring Work Rest
21. Face Mills *(up to 18½" diameter)*
22. End Mills *(with taper holding attachment only)*
23. Drills *(from 3/32" to 1⅜" diameter)*
24. Saws *(from 7½" to 26" diameter)*

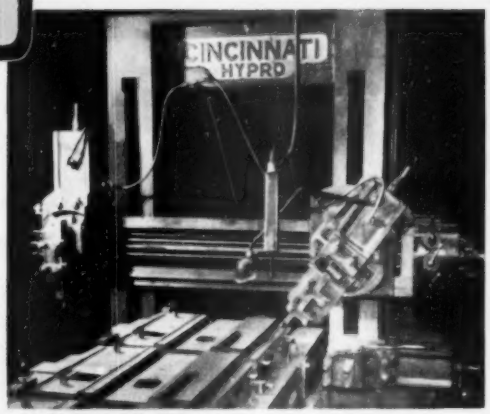


LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.

CINCINNATI HYPRO PLANER

HOLDS IMPORTANT CROSS CARRIAGE BEARING SURFACES *parallel and flat!*

All Horizontal and Vertical Surfaces Machined Within ±.001″; Planing Eliminates Possible Distortion of Shallow Castings in Interrupted Cutting Operations



Photographs Courtesy Gisholt Machine Co., Madison, Wis.

Six horizontal and seven vertical surfaces and dovetail on each of these four turret lathe cross carriages are rough, semi-finish and finish planed and held to ±.001″. Planing maintains the parallelism necessary to fit hardened and ground steel ways in subsequent assembly operations. With this Cincinnati Hypro machine using a single tool, danger of distorting or warping the intricate castings is eliminated. There is no problem of heat generation. Flatness of each part and relationship of each planed surface one to the other is easily maintained.

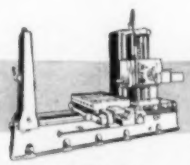
"String" arrangement of the four carriages on the machine table speeds the overall planing operation. The two rail heads are used simultaneously to rough and finish plane carriage ends. One head is used for all other surfaces because the narrow width of the workpiece does not permit use of two tools at once.

Depend upon Cincinnati Hypro Machines to produce the finish and accuracy you need

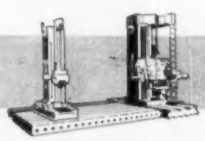
Both heavy and fragile machine and equipment components can be produced singly or in production lots on Cincinnati Hypro Machines. Investigate the advantages of planing, using rail heads and side heads simultaneously to remove metal faster and more accurately. Handling of intricate work, using advanced planing methods, may easily mean added profits for you. Recommendations by experienced Cincinnati Planer engineers will be made upon request and without obligation.

GIDDINGS & LEWIS
FOND DU LAC

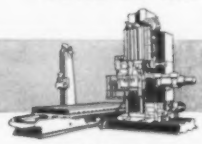
G&L HYPRO



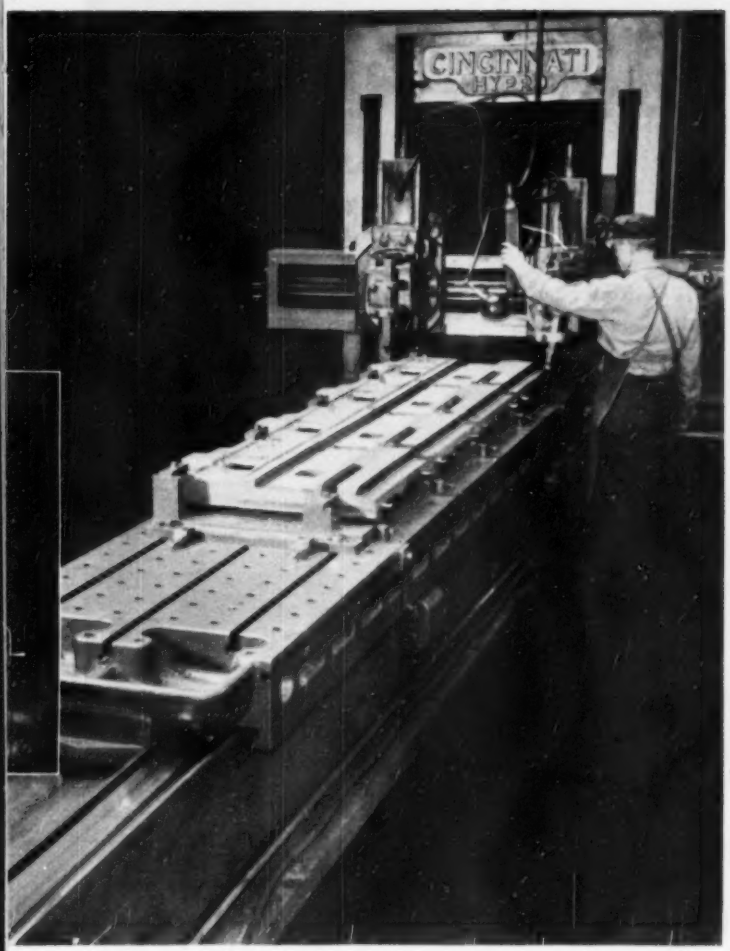
G. & L. Table Type Horizontal Boring Machine



G. & L. Floor Type Horizontal Boring Machine



G. & L. Planer Type Horizontal Boring Machine



Typical Operations, Speeds and Feeds

1. Rough 6 horizontal surfaces and 2 lugs.
2. Rough and finish plane 2 carriage ends, using rail heads simultaneously.
3. Rough 7 vertical surfaces and dovetail.
4. Repeat 1 and 3 as semi-finish operations.
5. Repeat 1 and 3 as finish operations.
6. Remove parts for subsequent machining.

Speeds:

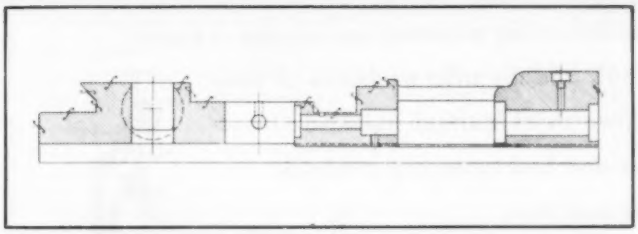
145 F.P.M. roughing with 210′ return speed
90 F.P.M. semi-finish with 190′ return speed
90 F.P.M. finish with 190′ return speed

Depth and Rate of Feed:

Horizontal Surfaces
Roughing 5/16″ at .045″
Semi-finish 5/16″ at .010″
Vertical Surfaces
Roughing 1/8″ at .045″
Semi-finish 1/8″ at .045″

Cutters:

Carbide tipped tools



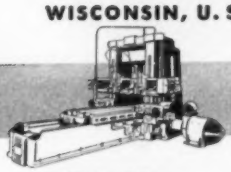
PRODUCE *More at Low Cost* with these other HYPRO MACHINES*

Openside Planers
Planer Type Milling Machines
Frog and Switch Planers
Vertical Boring and Turning Mills
Special Planers and Boring Mills

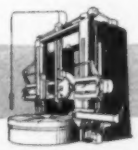
* Optional with non-metallic table ways if desired.

MACHINE TOOL COMPANY

WISCONSIN, U. S. A.



Cincinnati Hypro Double Housing Planer

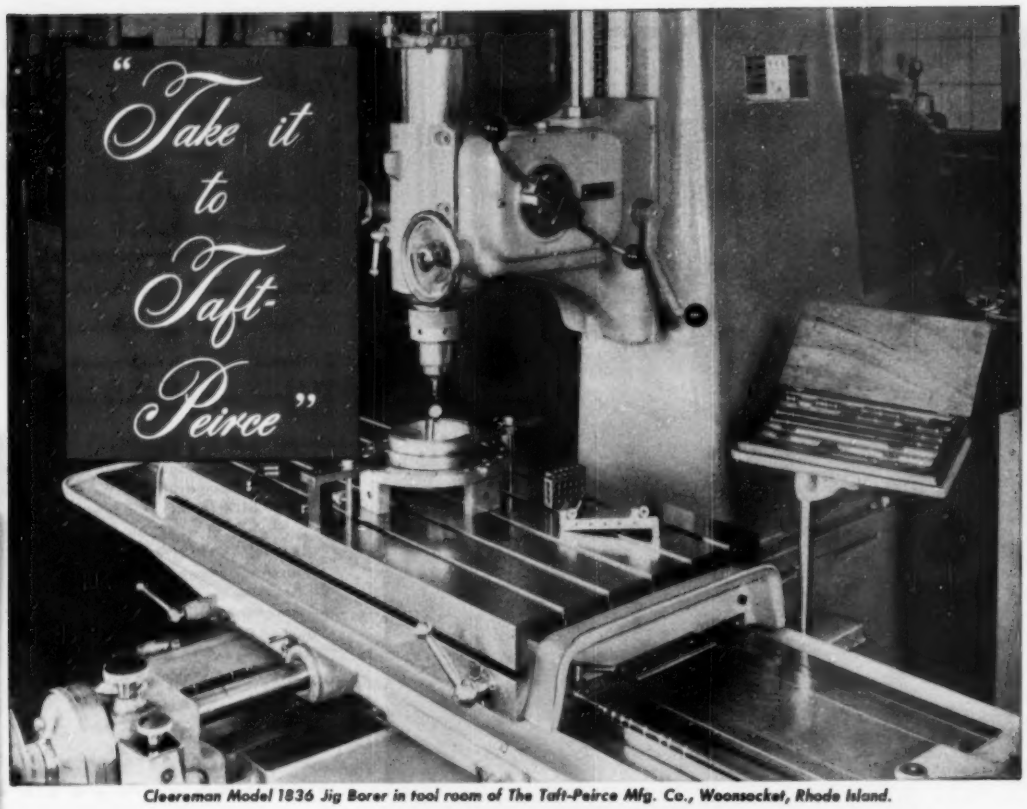


Cincinnati Hypro Vertical Boring and Turning Mill

Cincinnati Hypro Planer Type Milling Machine

G. & L. Vertical Plastics Injection Press

DAVIS
Complete Tooling Service

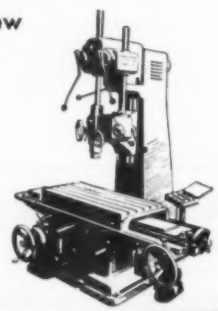


Cleereman Model 1836 Jig Borer in tool room of The Taft-Peirce Mfg. Co., Woonsocket, Rhode Island.

...where a CLEEREMAN JIG BORER

helps maintain this shop's world-wide reputation of unexcelled precision

Taft-Peirce world-wide reputation for accuracy and quality is based upon selected precision tools and the strict traditions of New England craftsmanship. Upwards of fourteen hundred machine tools of the latest and best types are available for every class of machine tool work.



BRYANT Machinery & Engineering Company

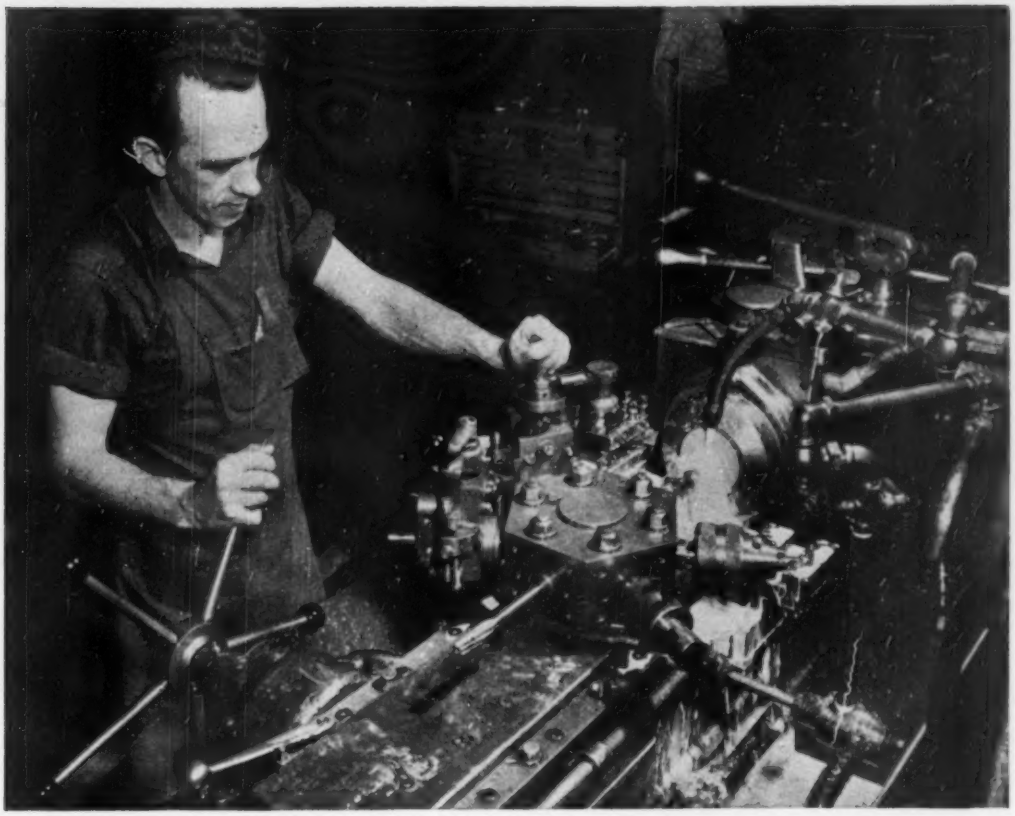
General Office
400 West Madison Street Chicago 6

Cleereman Jig Borers are being installed by an increasing number of plants where, as is the case with Taft-Peirce, uncompromising accuracy is essential.

Affiliated with—

CLEEREMAN MACHINE TOOL CO. Green Bay, Wis.

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

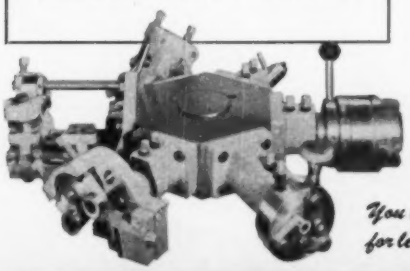


PICTURE OF A MAN PRODUCING 25% MORE

Same job, same operation, *But Better Tools!*

This shop has found it can do more jobs faster on Warner & Swasey Turret Lathes with the Standard Tooling Setups that fit their requirements. Multiple and combined cuts, with shorter setup time, mean profitable production increases.

● Electrol Incorporated, of Kingston, New York, transferred this precision Stop-Plunger job to a Warner & Swasey No. 3 Universal Turret Lathe because it had the speed and accuracy required, as well as the proper tooling for the job. The result was a 25% increase in production of this high pressure hydraulic control part.



Permanent Universal Tooling setups and the right tools which can help you increase your output are all in the new 196 page Warner & Swasey Tool Catalog. Write for your copy.

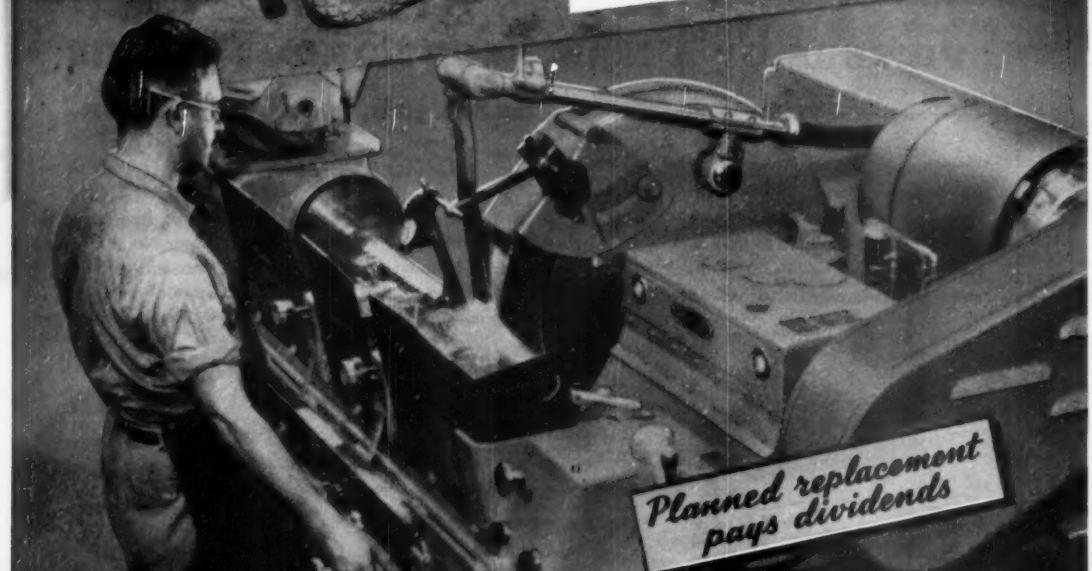
You can machine it better, faster, for less...with a Warner & Swasey

WARNER & SWASEY Machine Tools *Cleveland*

TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

HELPING MAKE MOLEHILLS OUT OF MOUNTAINS

Caterpillar Diesel DW20 Tractor and W20 Wagon on the job



Planned replacement pays dividends

Making better products to make other products better

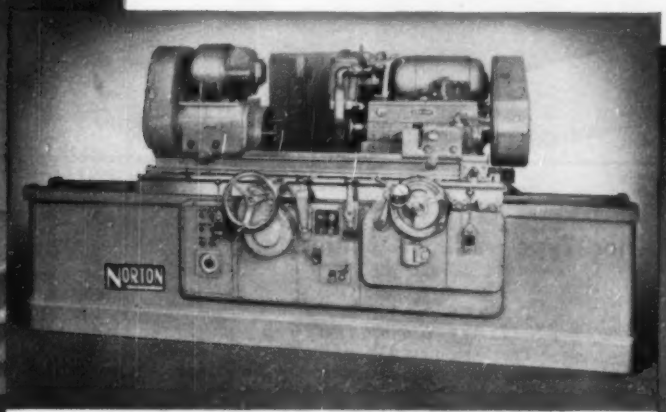
Precision parts for giant tractors economically ground in Norton "CTU's"

IN the huge Caterpillar plant in Peoria, Norton Type CTU Grinders are a "natural" for economically turning out many of the precision parts which are the "heart" of huge tractors and earth-moving equipment.

Like other manufacturers of motive equipment where precision parts are essential, Caterpillar knows that the Norton CTU's produce speedily and accurately—always basic to achieving lowest costs.

Discover for yourself how you can grind more profitably with the CTU. There is a Norton representative or dealer near you who will gladly provide details. No obligation—of course.

M-591



Norton 10" x 36" Type CTU Semiautomatic Machine

Write for free catalogs. Cat. No. 1488—6" Machine; Cat. No. 1787—10" Machine.

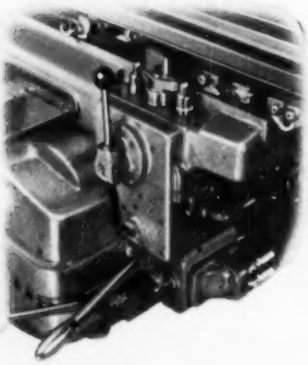
NORTON

Grinding and Lapping Machines

NORTON COMPANY, WORCESTER 6, MASS. · Warehouses in Five Cities · Distributors in All Principal Cities

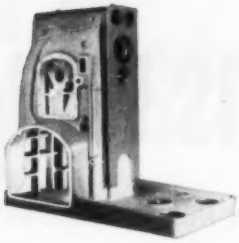
GREATER PRODUCTIVITY

A new line of Knee-Type Milling Machines KEARNEY & TRECKER MILWAUKEE **CK's**

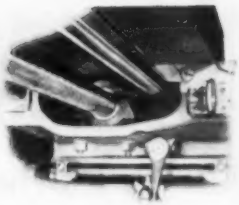


THERE'S one big production feature on Kearney & Trecker's new CK milling machines that gets the "yes" vote of cost-minded production executives and shop men every time. It's Kearney & Trecker's famous Mono-Lever Control — *one lever that controls all table movements!* These men like it because it reduces idle cutter time — shortens floor-to-floor time. (Past performance facts have shown savings as high as 96% on some milling operations!) For you this means *greater productivity* and lower costs on your jobs. What's more, operators like Mono-Lever Control because it provides greater operating convenience — a simpler, faster method with less fatiguing work for them. Investigate Kearney & Trecker's new CK line of milling machines. See how Mono-Lever Control combined with all the other big CK machine features make them the most productive and the most profitable milling machines you can buy today — anywhere!

Replacement of obsolete machine tools is an



GREATER RIGIDITY — Yes, these new CK columns are the most rigid milling machine columns we've ever designed! They give you 1000 pounds more metal scientifically distributed in heavier ribbing, box section, sponson construction . . . to effectively absorb vibration from heaviest cutting loads.

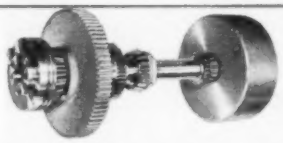


SMOOTHER FEED PERFORMANCE — with a new design 2" diam. heavy-duty, table feed screw that affords greater bearing contact and runs through an extra-long table feed nut. These new CK machines are equipped with a backlash eliminator for more effective climb milling, more accuracy and longer screw life.

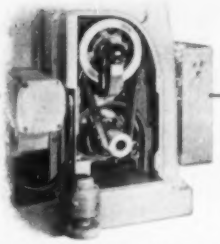
GREATER ADAPTABILITY — No. 60 Heavy Duty drive flange on Nos. 4, 5 and 6 machines enables use of heavy duty arbors with flange drive for large single or multiple cutter setups; or bolting large face-milling cutters directly to spindle nose. Average setups use standard arbors with No. 50 spindle drive.

NON-GLARE RAPID-SET DIALS—You'll avoid costly errors in reading and setting these new micrometer dials. They're vapor blasted to give you a satin surface with high contrast markings. They're easy and quick to set and provide positive lock at every setting.

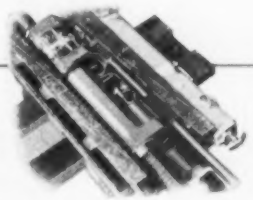
FEEDS AND SPEEDS TO TAKE FULL ADVANTAGE OF MODERN CUTTING TOOLS — and you really can do it with the broad feed and speed ranges on Kearney & Trecker's new CK milling machines. You get 24 spindle speeds (15 to 1500 rpm on Nos. 2 and 3, 13 to 1300 rpm on Nos. 4, 5 and 6) with Kearney & Trecker's automatic protecto-mesh shift to eliminate gear clashing. And there's the extra-wide feed range — 32 changes from ¾" to 90" per minute—with separate 3 or 5 hp feed and rapid traverse drive.



GREATER CUTTING EFFICIENCY — Added momentum of spindle-mounted flywheel assures longer cutter life and greater efficiency, through smoother, more positive drive — a key to most efficient use of modern cutting tools. Spindle rigidly supported by Kearney & Trecker's original 3-bearing design.



GREATER HORSEPOWER — where you need it. That's what you get with new CK independent motor drives for spindle and for feed and rapid traverse. Depending on machine size (Nos. 2, 3, 4, 5 or 6), machines range from 10 to 25 hp for spindle drive and 3 to 5 hp for feed and rapid traverse.



GREATER MACHINE LIFE — through automatic lubrication and generously proportioned gears and shafts throughout for overload conditions. There's a forced flood system in the column and knee, and a positive metered, pressure pump system for table, saddle and knee ways, and table feed assembly.

Kearney & Trecker's new CK line of knee-type machines is designed to meet every demand of present-day milling . . . making them more accurate, and MORE PRODUCTIVE for you. Contact your Kearney & Trecker representative or write direct to obtain their complete specifications. Find out how CK machines easily replace obsolete machines at substantial savings to you. Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS

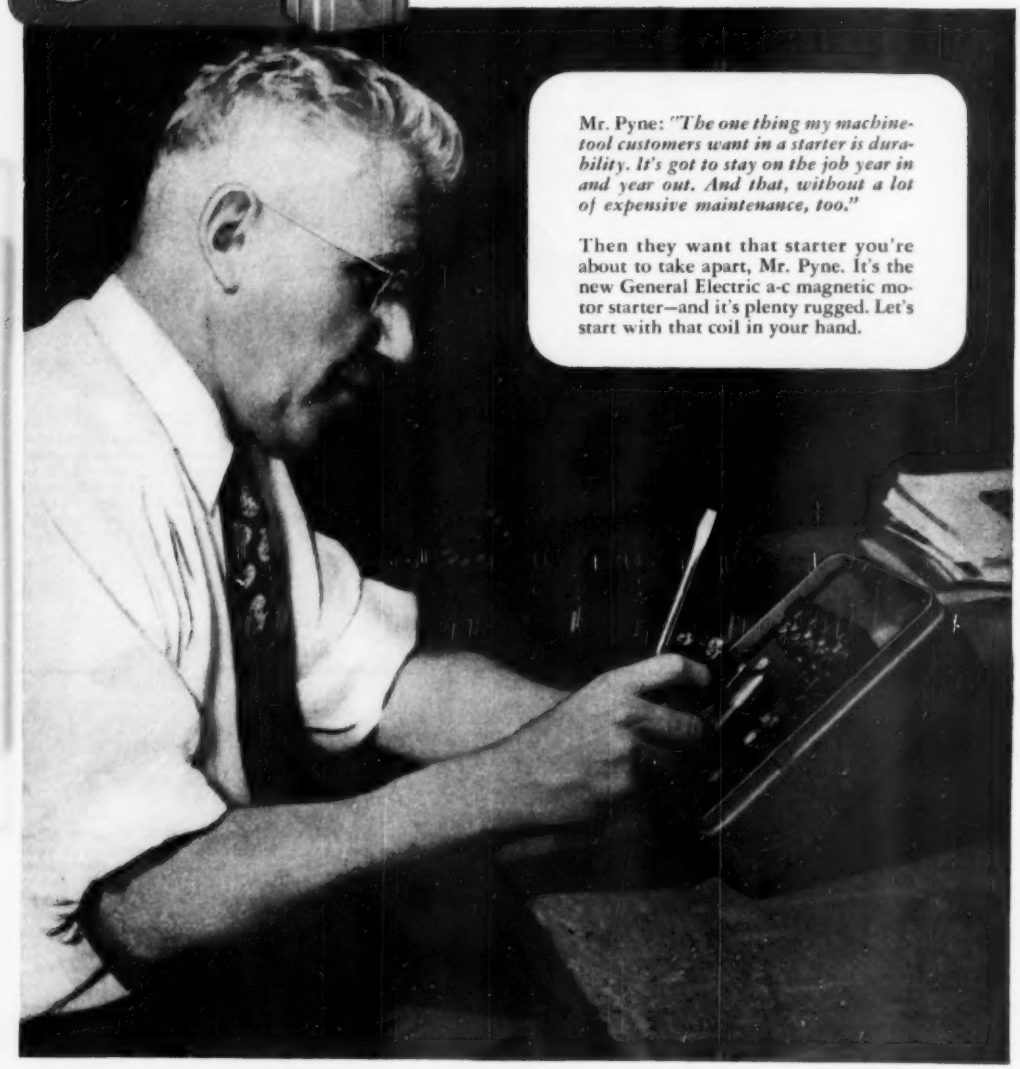
investment that makes Dollars and Sense.

New!

MOTOR STARTERS

5 reasons why

R. S. PYNE, THE VAN NORMAN COMPANY,



Mr. Pyne: *"The one thing my machine-tool customers want in a starter is durability. It's got to stay on the job year in and year out. And that, without a lot of expensive maintenance, too."*

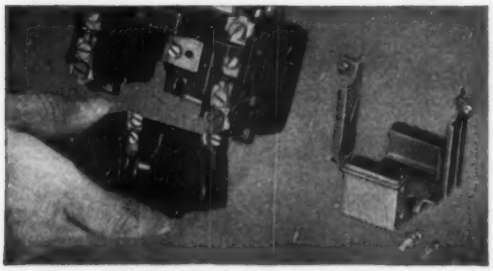
Then they want that starter you're about to take apart, Mr. Pyne. It's the new General Electric a-c magnetic motor starter—and it's plenty rugged. Let's start with that coil in your hand.

GENERAL ELECTRIC

730-11

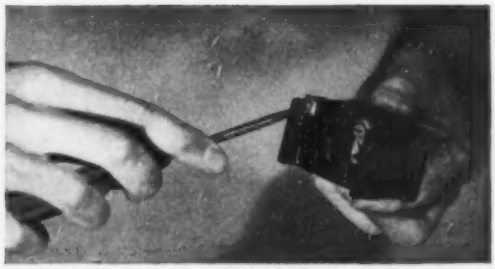
G-E starters last longer!

PROVES IT FOR HIMSELF WITH THE SCREWDRIVER TEST



Mr. Pyne: *"Looks different. What's it got?"*

1 That coil—we call it the "strong box" magnet coil—lasts two to five times longer than a conventional coil. Suppose the electrician's screwdriver slips and hits the coil. The windings can't be damaged because they're firmly locked in a block of molded plastic.



Mr. Pyne: *"Will these terminals work loose?"*

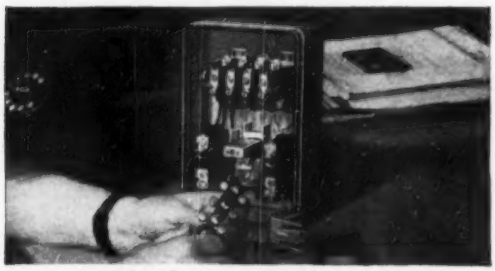
2 Not a chance! They're permanently anchored in the coil enclosure so they can't loosen, even after years of operation. You'll notice they're on the front of the coil, too. That makes for easier servicing.

Mr. Pyne: *"This magnet moves smoothly enough."*

3 Yes—and you can be sure it will do just that even after it's been in service for years. That's because the plastic coil block is made with a permanent "molded in" lubricant. No metal-to-metal friction, no bearings to wear!

Mr. Pyne: *"Contacts that burn easily seem to be a major headache. How about these?"*

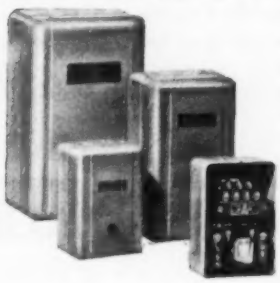
4 Under average conditions you can count on these contact tips to stand up even on the toughest "start-stop" service. They're made of fine silver and there's little chance of their welding together thanks to a high initial tip pressure. And the arc hood keeps each tip protected in its own chamber.



Mr. Pyne: *"What about corrosion?"*

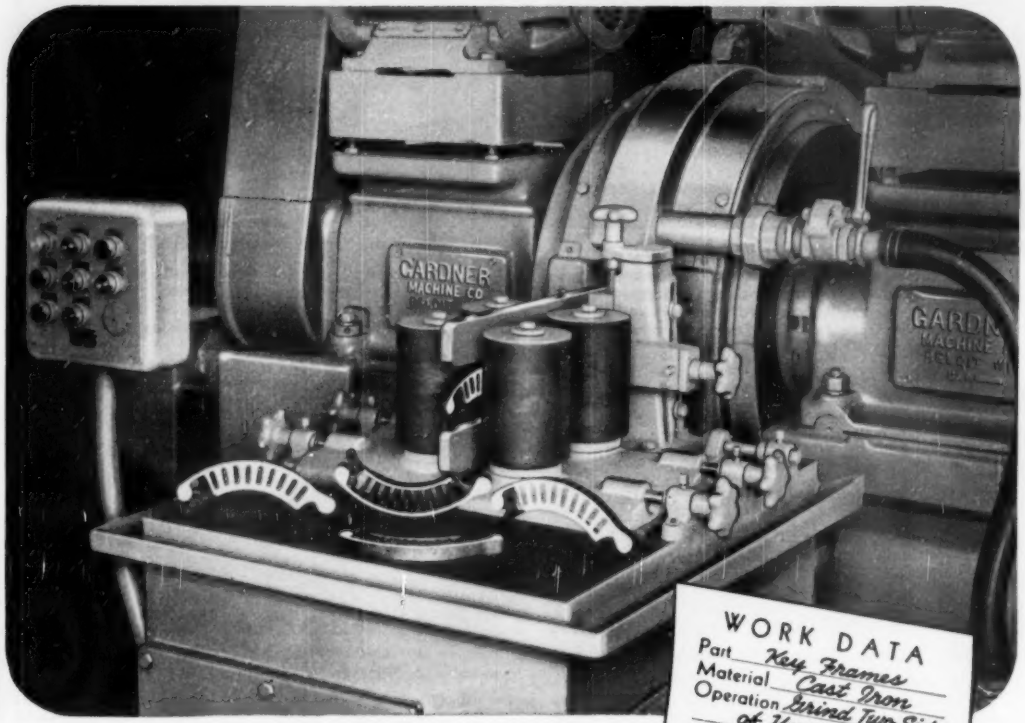
5 No problem at all! All steel parts are zinc plated. The arc chutes are impregnated with a special wax to resist moisture absorption. Finally, the case is coated with a special corrosion-resisting material and painted an attractive gray.

WHY DON'T YOU BUY ONE AND COMPARE



Make the screwdriver test yourself — and see why the new G-E magnetic motor starter lasts longer than any other you can buy. Your G-E representative or distributor salesman can supply you with this new starter from stock in NEMA sizes 0, 1, 2, and 3 for a-c motors up to 50 hp. For a complete description, write for the "tell all" bulletin, GEA-5153. Section 730-11, Apparatus Dept., General Electric Company, Schenectady 5, N.Y.

Double GARDNER-GRINDING brings your costs DOWN



WORK DATA

Part *Key Frames*
Material *Cast Iron*
Operation *Grind Two Sides of Unequal Area*
Tolerances *.001" for Parallelism; .002" for Uniformity*
Stock Removal *.075" Over All*
Production *10 to 12 Pieces Per Minute, Per Cut*
Feed *"Feed-Thru" Fixture with Rubber Rolls*
Machine *No. 125-26" Gardner Double Grinder*

GARDNER Semi-Automatic Double Grinders, like the No. 125-26" machine with "feed-thru" fixture, illustrated, provide the answer for reducing your flat-surfacing costs because both sides of the piece are precision ground at one pass. A wide variety of parts can be handled by this method.

High production and lower unit costs are two items all-important in manufacturing for todays' market. Look to Gardner Double Grinding for your lower unit costs!

Ask for our DOUBLE-GRINDING Bulletin!

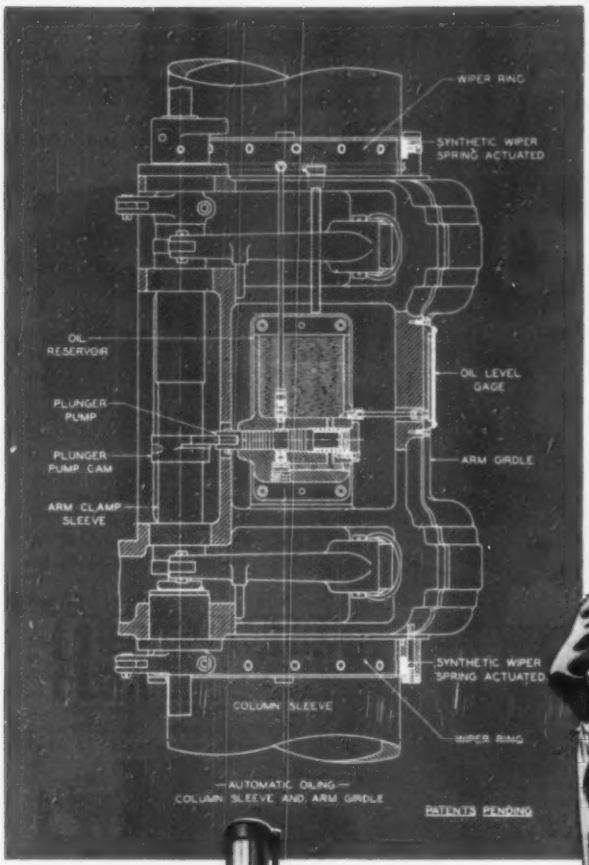
GARDNER MACHINE COMPANY

410 EAST GARDNER STREET . . . . BELOIT, WISCONSIN, U.S.A.

Just a memory now

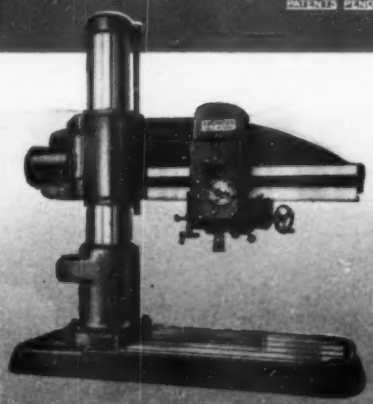
Column Scoring a thing of the past...

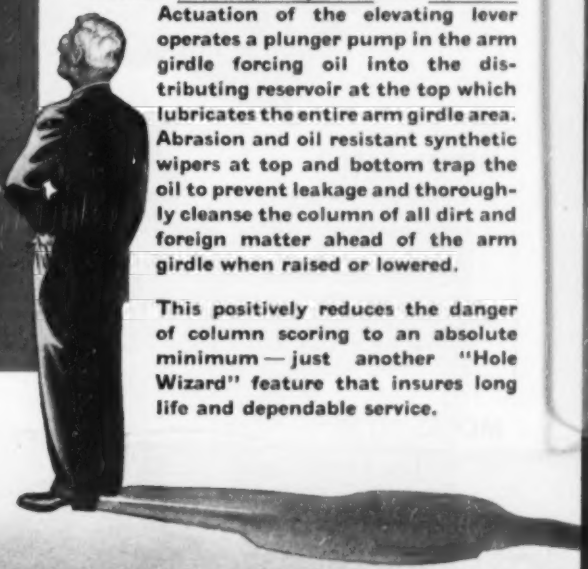
We've done something about it—



On the new "AMERICAN" Hole Wizard Radial the arm girdle and its mating column area are automatically oiled and cleansed. Actuation of the elevating lever operates a plunger pump in the arm girdle forcing oil into the distributing reservoir at the top which lubricates the entire arm girdle area. Abrasion and oil resistant synthetic wipers at top and bottom trap the oil to prevent leakage and thoroughly cleanse the column of all dirt and foreign matter ahead of the arm girdle when raised or lowered.

This positively reduces the danger of column scoring to an absolute minimum — just another "Hole Wizard" feature that insures long life and dependable service.





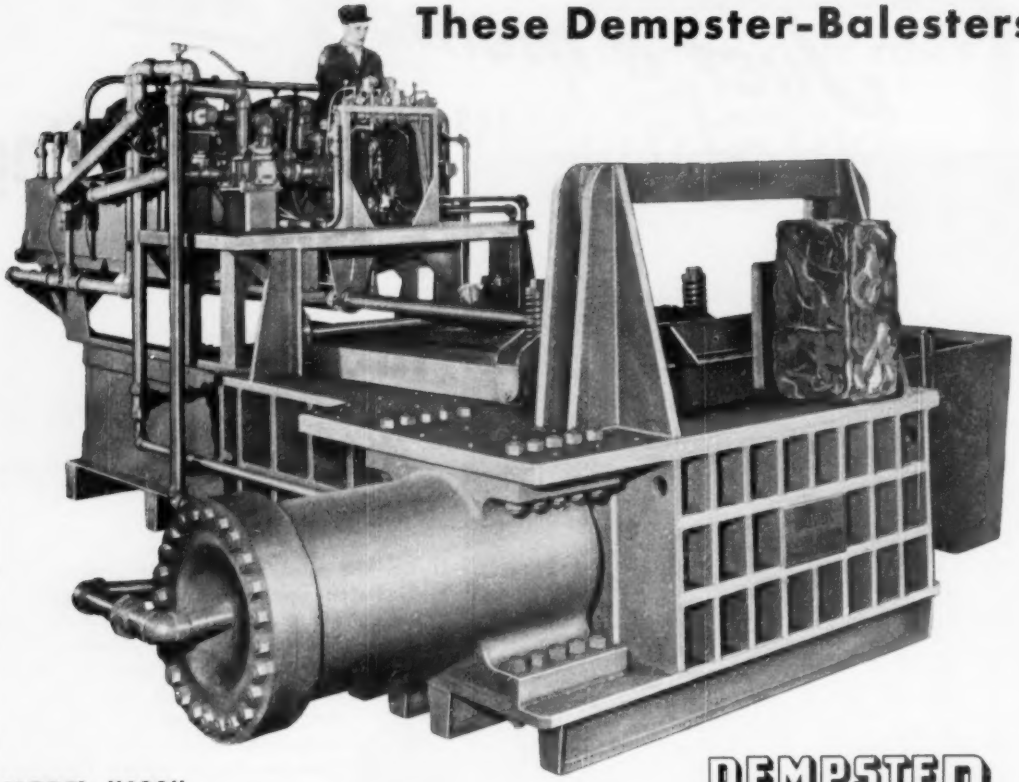
Bulletin No. 327 describes this and other exclusive "Hole Wizard" features of proven value. Want one?

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

These Dempster-Balesters



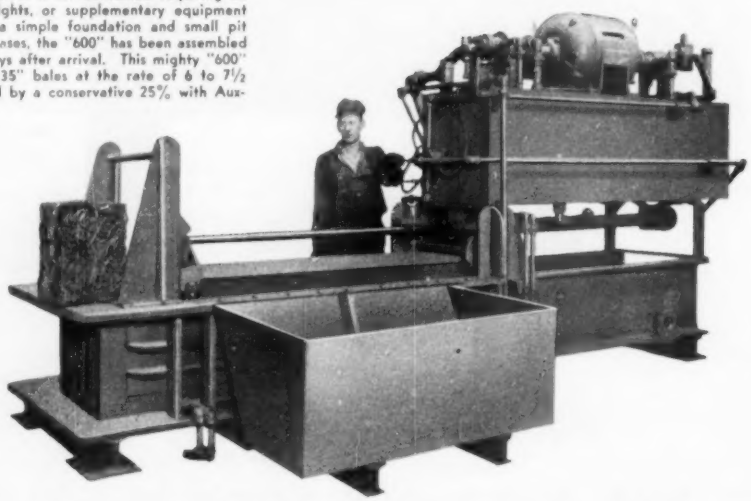
DEMPSTER BALESTER
TRADE MARK REG.

MODEL "600"

Installation expense of a big capacity scrap metal baling press need no longer be a costly item running into several thousand dollars. On the Dempster-Balester "600" all hydraulic assemblies are integral to the machine itself, and the "600" press is self-contained requiring no air compressors, springs, counterweights, or supplementary equipment for its operation. Therefore, only a simple foundation and small pit for ejector are required. In many cases, the "600" has been assembled and in operation in three to four days after arrival. This mighty "600" turns out high density 16" x 18" x 35" bales at the rate of 6 to 7½ tons per hour. This rate is increased by a conservative 25% with Auxiliary Compression Door.

MODEL "128"

The Dempster-Balester Model 128 is an efficient, portable baling press that turns out scrap metal bales at the rate of 1½ to 2 tons per hour. Bale measures approximately 10" x 12" x 16". Charging box may be converted to make smaller size bales. The Dempster-Balester Model 125, not shown, produces the same size bales as the Model 128 at the rate of 1 to 1½ tons per hour.



DEMPSTER BROTHERS

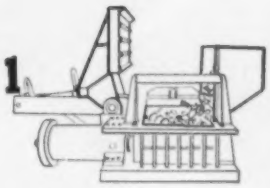
Offer You The Nearest Thing Available To "Automatic" Scrap Metal Baling

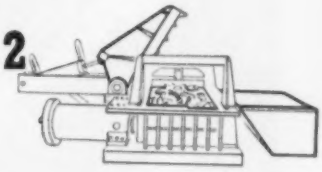
Never in the history of mechanical scrap metal baling has one line of presses played such an important role in cutting scrap handling costs as have the Dempster-Balesters. These high speed presses, engineered for top production and low cost operation, are making scrap metal baling highly profitable. In only ten years hundreds of Dempster-Balesters have been installed in 168 cities in 40 states . . . in addition to 13 foreign countries. Without question, Dempster-Balesters are the most economical, most efficient presses baling scrap metal today!

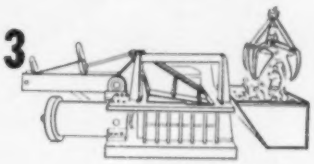
AUXILIARY COMPRESSION DOOR INCREASES BALING PRODUCTION 25%, OWNERS REPORT

With the hydraulically actuated Auxiliary Compression Door, shown below on Model "275", every phase of the baling cycle is automatic from the moment scrap metal is dumped into Skip-Pan Loader until finished bale is ejected. Skip-Pan is standard equipment on all Dempster-Balesters. Users report a conservative 25% increase in production and as much as a 40% reduction in cost per bale with the compression door. Compression Door is available for all Dempster-Balester models. Detail drawings at right show the 1-2-3 production punch of a Dempster-Balester with Auxiliary Compression Door and Skip-Pan Loader. 1—Skip-Pan dumps scrap metal into charging box. 2—Skip-Pan returns to loading position as door begins compression stroke. 3—Door compresses scrap—usually with one stroke, permitting charging box door to be closed without further arranging. During baling cycle Skip-Pan is reloaded and charge dumped into box as soon as bale is ejected.

Write today for your copies of the folders on the Dempster-Balesters. A product of Dempster Brothers, Inc.

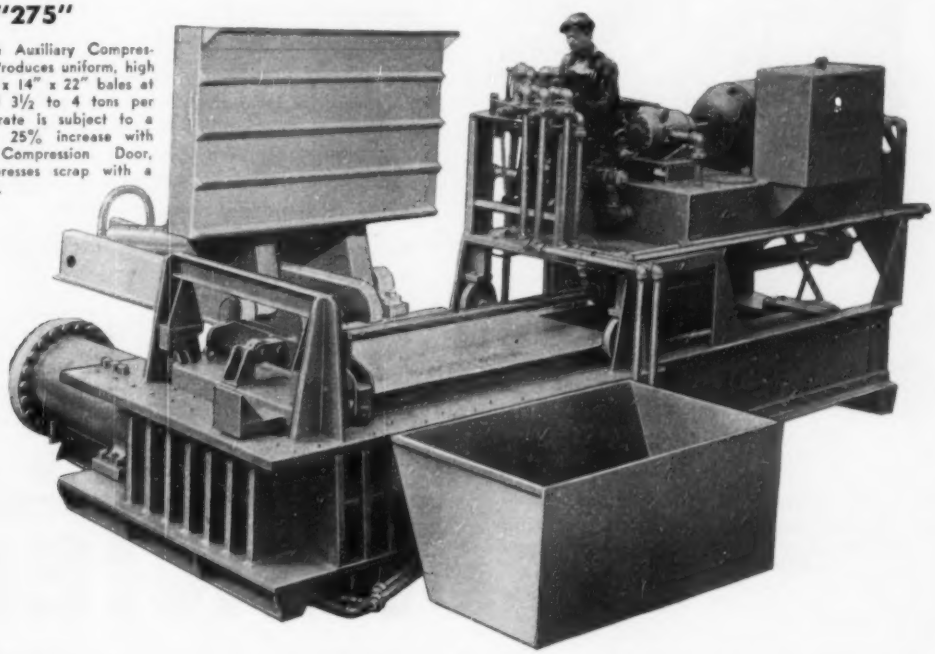




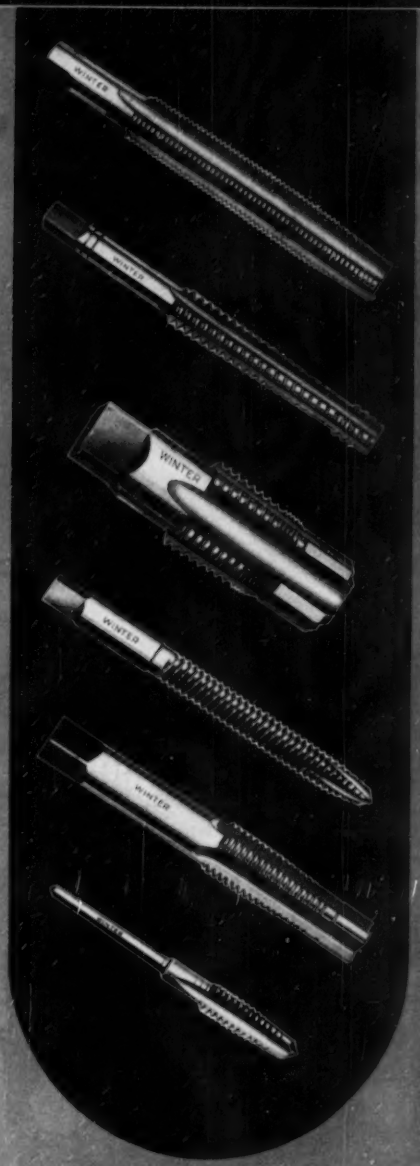


MODEL "275"

Shown with Auxiliary Compression Door. Produces uniform, high density 14" x 14" x 22" bales at the rate of 3½ to 4 tons per hour. This rate is subject to a conservative 25% increase with Auxiliary Compression Door, which compresses scrap with a 45-ton force.



4100 Dempster Building, Knoxville 17, Tenn.



WINTER TAPS FOR SPECIAL APPLICATIONS

Tapping problems are often encountered when special materials, odd sizes and types of threads, inaccessible work conditions, and/or high production requirements are involved. Taps of special dimensions and designs are sometimes called for.

Winter Tap Engineers are well seasoned and qualified to develop the most efficient taps for your special applications. They will also help you get the most out of these Winter "Balanced Action" Taps. The outstanding accuracy and quality of all Winter Taps, stock or special, makes them a sound investment.

Winter makes all types and sizes of stock taps and dies as well as special threading tools.

ALWAYS AT YOUR SERVICE

YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—so close to your tapping problems as the telephone on your desk.

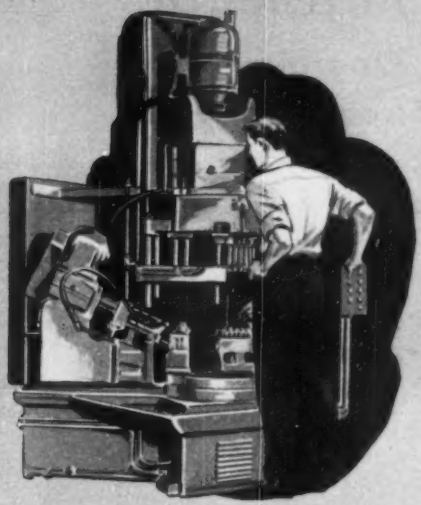
WINTER

WINTER BROTHERS COMPANY • Division of the National Twist Drill and Tool Company

Rochester, Michigan, U. S. A. Distributors in Principal Cities • Branches in New York, Detroit, Chicago, San Francisco

NATIONAL TWIST DRILL & TOOL CO. ROCHESTER MICH. U.S.A.

National



COUNTERBORES AND INVERTED SPOTFACERS

Counterboring is one of the most punishing metal cutting operations in the shop. Uneven starting surfaces and lack of support are often met with.

National Interchangeable Counterbores and Inverted Spotfacers are designed to meet such conditions. Their sturdy construction, combined with simple interchangeability and rigid alignment, makes them ideal tools for production counterboring and spotfacing.

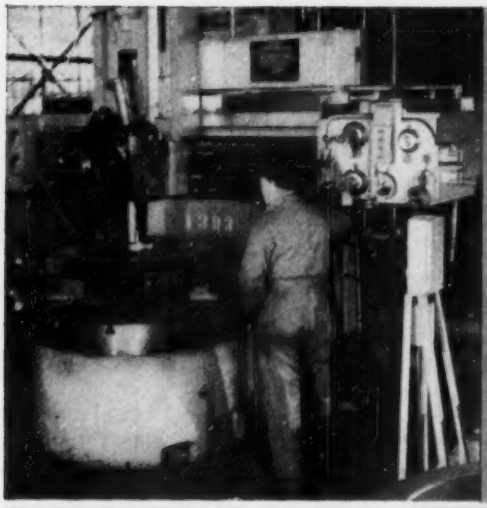
For especially difficult or unusual applications, design and field engineers are at your service. The complete National line includes Twist Drills, Reamers, Milling Cutters, End Mills, Hobs, and Special Tools.

"CALL YOUR DISTRIBUTOR"

It is NATIONAL'S firm belief, based on long experience, that the local industrial distributor is the one best source for all staple industrial needs—including NATIONAL Metal Cutting Tools.

NATIONAL TWIST DRILL AND TOOL COMPANY • Rochester, Michigan, U. S. A.

Distributors in Principal Cities • Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco



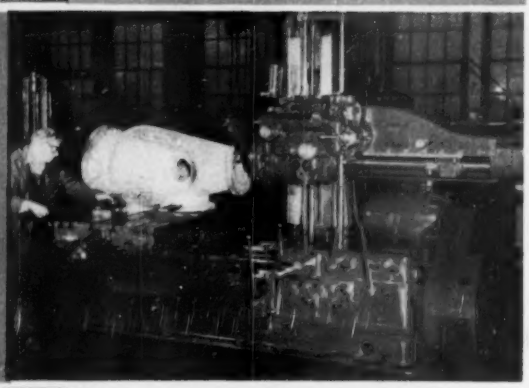
MAN-AU-TROL
VERTICAL
TURRET LATHES

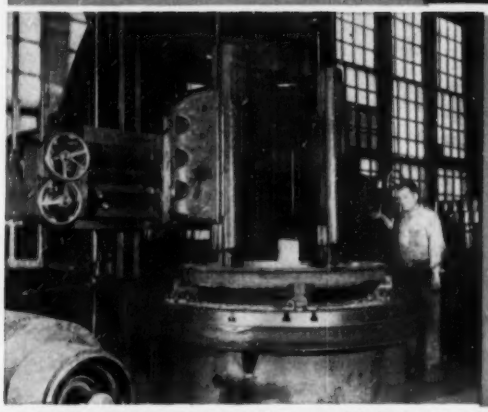
MANUAL OR AUTOMATIC

Operation For Short Run Jobs or the Longer Production Runs.

BULLARD
Universal
FOR
HORIZONTAL BORING MILL JOBS

Performance Plus Utility





CUT MASTER
VERTICAL
TURRET LATHES
IN 6 SIZES
30 INCH TO 74 INCH

Assured Accuracy and a Plus in manufacturing Economy. Simultaneous cutting with three heads.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

FACTS vs OPINIONS

These men are building confidence. They are part of a research team that is completing a two year Tap Torque Testing Program on specially designed equipment in "Greenfield's" physical laboratory.

Their findings, facts permanently recorded on oscillograms by the electronic torque meter, are being fed constantly into our engineering and manufacturing operations where they are used to help give you better and better Cutting Tools.

Yes, they're building confidence that if it's marked "Greenfield" it's right.

BUY THREADING TOOLS WITH *CONFIDENCE*

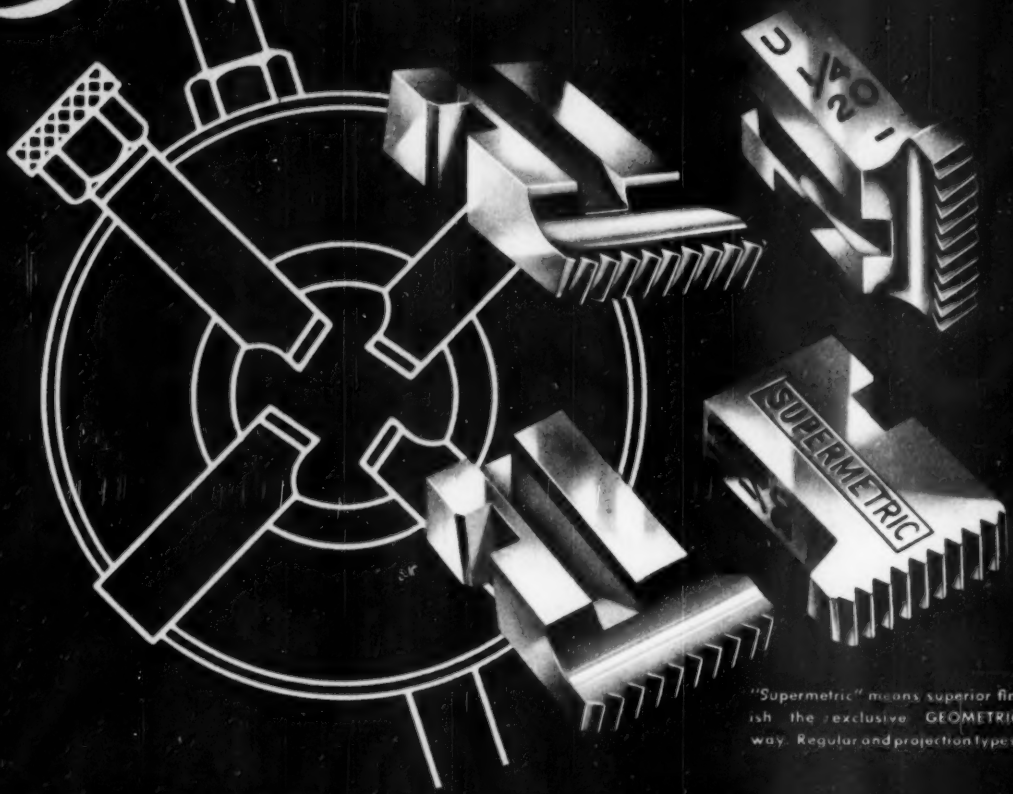
BUY *GREENFIELD* TOOLS

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASSACHUSETTS

Supermetric

THE ALL OVER GROUND DIE HEAD CHASERS



"Supermetric" means superior finish the exclusive GEOMETRIC way. Regular and projection types.

Yes, they're ground ALL OVER not just in the threads! Every surface even to the cam lug slots and keyways are SUPERMETRIC ground to closest tolerances and finest finish, giving smoother action in the head, longer life AND better threads. No matter how you look at it, a SUPERMETRIC chaser is a Superior chaser.

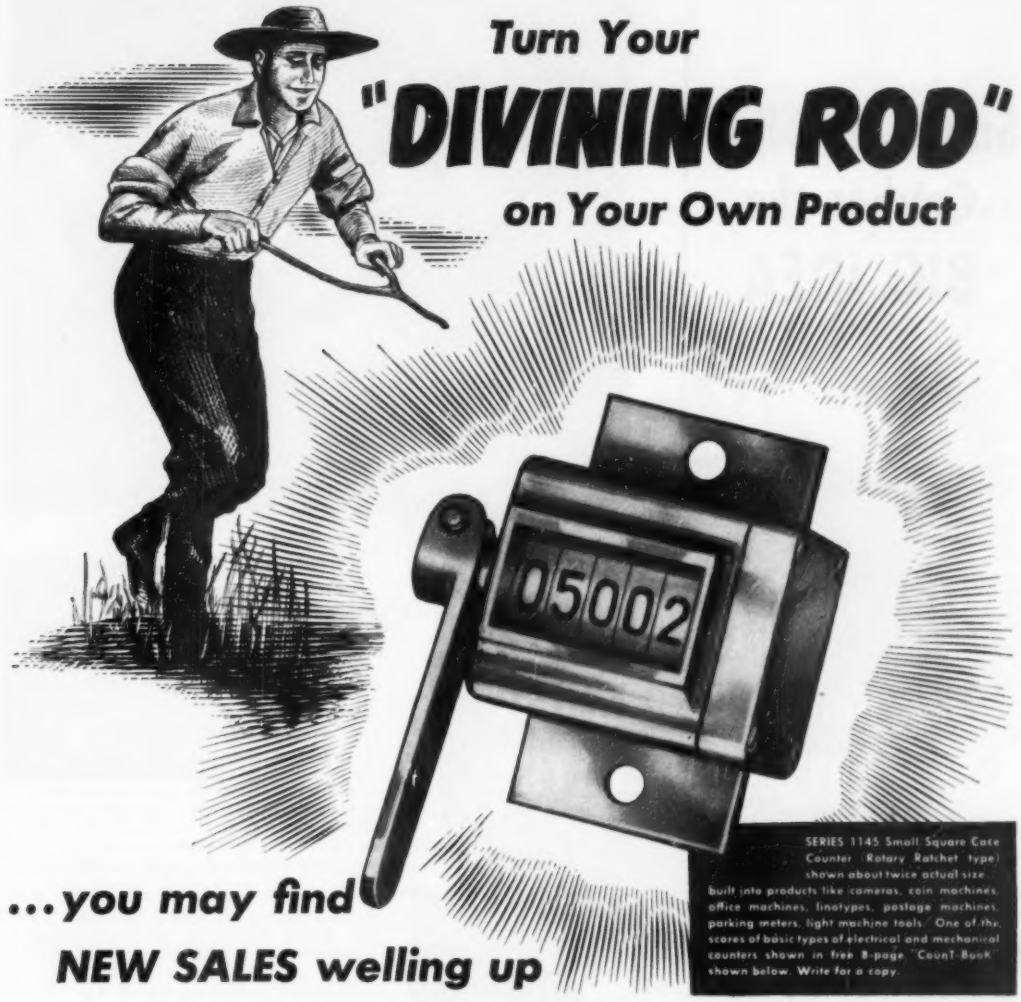
WRITE FOR ACTUAL PRODUCTION RECORDS

BE SURE Buy GEOMETRIC

GEOMETRIC TOOL COMPANY DIVISION

GREENFIELD TAP AND DIE CORPORATION

NEW HAVEN 15, CONNECTICUT



Turn Your "DIVINING ROD" on Your Own Product

SERIES 1145 Small Square Cote Counter (Rotary Ratchet type) shown about twice actual size built into products like cameras, coin machines, office machines, linotypes, postage machines, parking meters, light machine tools. One of the scores of basic types of electrical and mechanical counters shown in free 8-page "Count-Book" shown below. Write for a copy.

...you may find NEW SALES welling up from a hidden COUNT-Ability

As the pioneers searched for water with an educated witch-hazel switch . . . so turn your own mathematical mind on this million-dollar question:

"Would My Product Be More Useful To My Customers . . . If It Could Count?"

Call a Veeder-Root engineer and let him help you answer that question. Then, if the answer is favorable, he will *build-in* a Veeder-Root Counter as an integral part of your product . . . to build more sales than you ever counted on before. Look up the nearest V-R office in your Classified Directory — or call the main office: Hartford 7-7204.

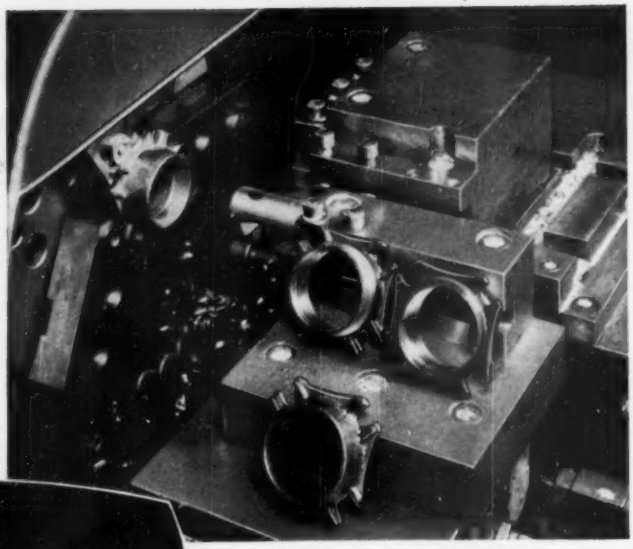
Free Book

Veeder-Root COUNTERS "Count Anything on Earth"

VEEDER-ROOT INC., HARTFORD 2, CONN.

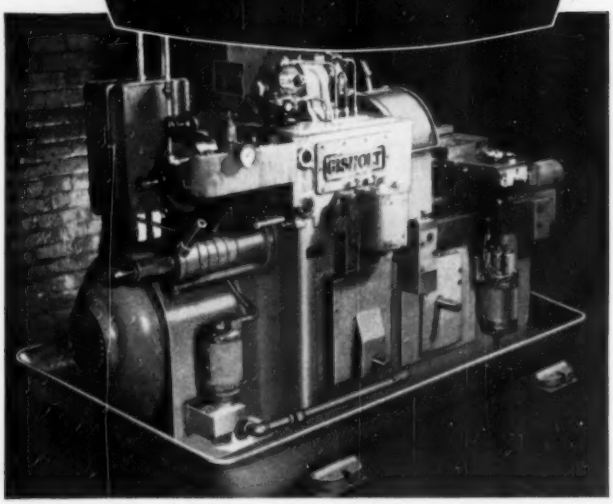
In Canada: Veeder-Root of Canada, Ltd., 955 St. James Street, Montreal 3.
In Great Britain: Veeder-Root Ltd., Kilspindie Rd., Dundee, Scotland.

Small Job Shop Catches the BIG IDEA



cuts costs with—

GISHOLT No. 12 HYDRAULIC AUTOMATIC LATHE



No matter whether the shop is large or small . . . if there's volume, there's the opportunity to make money faster with automatic machining.

The Kilbourn Engineering Company of Milwaukee saw it—and proved it again—subcontracting these parts for electric hot water heaters with the Gisholt No. 12 Hydraulic.

Greater Production

With its fast automatic cycle and multiple cutting, the Gisholt turns out these parts at twice the rate of the previous method. A man merely loads and unloads the machine. The owner is not limited to this one job either. It is easily set up to handle a variety of work up to 12" in diameter.

Corner for Profit

Such work can be highly profitable for job shops. Especially when the whole operation can be tucked into one small corner of the shop as this one is.

Progressive thinking like this is what makes many small shops grow into big ones. Gisholt engineers can help you with all kinds of ideas for making the most of machine tools.

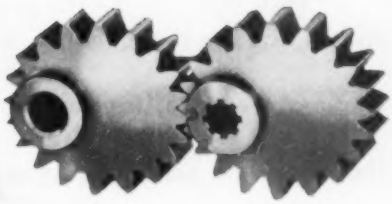
GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

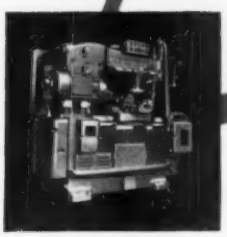
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

NOW HOB ELLIPTICAL GEARS

Another BARBER-COLMAN HOB DEVELOPMENT



Patent Applied For



● The gears shown are hobbed from bar stock on a Barber-Colman No. 16-16 Hobbing Machine and then cut apart for forming the hub and splined hole.

● Hobbing of elliptical gears with involute tooth profile is now a practical application of conventional gear hobbing, as a result of the developemnt of a special form hob. Control of the ellipse and tooth form is designed entirely within the hob and a conventional hobbing set-up is used.

The hob is a multi-thread, single purpose type. Each lead on the hob produces two involute teeth in the varying circular pitch of the gear. Full topping hob teeth finish the elliptical form to size.

A typical application for this type of gear is the motion required by a textile machine slasher arm. At one point in its revolution, greater speed is desirable than the normal running speed. Elliptical gears rotating on focal centers produce the desired varying ratio and eliminate complex linkage. All the advantages of hobbing — duplication of form, tooth spacing accuracy, and fine finish — are reproduced in the elliptical gear.

● If you have requirements for a constantly varying output from a constant speed input, send blue prints or samples to our Engineering Dept. for proposal and estimate on hobbed gears.

BARBER COLMAN

Barber-Colman Company

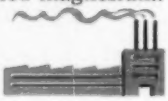
GENERAL OFFICES AND PLANT, 6144 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.

Horse Laugh

The foreman of this textile loom beam company knew how to perk up their sales. He figured that a magnesium beam

would be lighter . . . even stronger than the wood and cast-iron ones. But his boss gave him the horselaugh.

Said the shop had never handled magnesium. The foreman came to Aluminum Company of America, light-metal headquarters.



He learned that simple shop procedures

make handling magnesium no problem. From personal help

from Alcoa Engineers and books on designing

and fabricating, he learned that finished loom beam barrels

could be made from Alcoa Extrusions. He found that Alcoa foundries would cast the beam heads at exceptionally low prices. With

these facts, the foreman tackled his boss again . . . and convinced him. Now their lighter, stronger, splinter-free, warpproof beams are becoming standard in mills all over the country.

These two free books on magnesium and our broad technical experience can help your products, too. Write Aluminum Company of America, 2106K Gulf Building, Pittsburgh 19, Pa. Sales offices in principal cities.

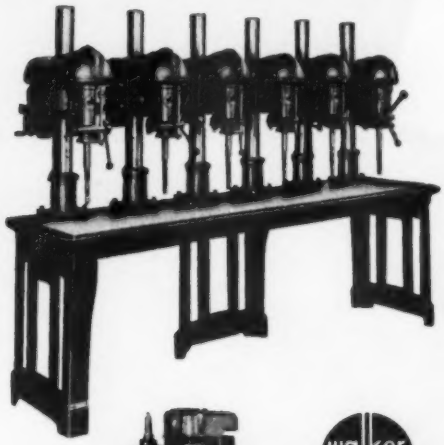
ALCOA

ALCOA ALUMINUM and MAGNESIUM

Cut your production costs

WALKER-TURNER *designed* DRILL PRESSES

cover a wide range of models, speeds, service



20" DRILL PRESS 6 Spindle, Hand Feed

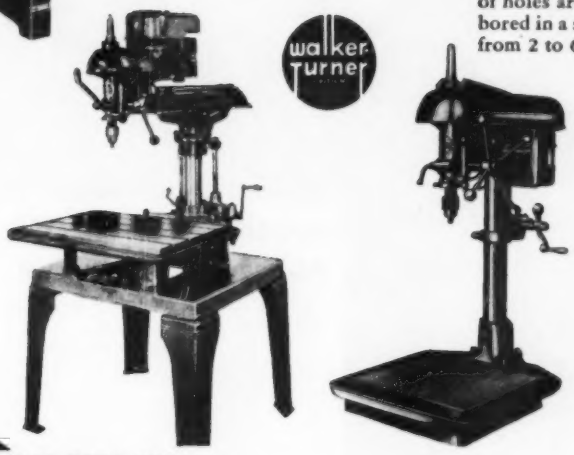
5 Speeds: 400, 800, 1200, 1800, 2600 (using a 1740 r.p.m. motor).

Spindle Travel: 6".

Capacity: 1".

Head Construction: one-piece gray iron casting, line-bored for greater accuracy.

For the industrial user where the production rate and initial cost are primary factors. Particularly effective in increasing production on many jobs where a series of holes are to be drilled, tapped, reamed or counterbored in a single piece. Other multiple-spindle models from 2 to 6 spindles.



15" PRODUCTION MODEL

4 Speeds: 600, 1250, 2440, 5000 r.p.m.

Spindle Travel: 4¼".

Capacity: 18½" chuck to table.

Head Construction: one-piece gray iron casting, line-bored for greater accuracy.

Compact, portable: can be located in assembly lines, reducing handling costs.

Adaptable for sanding, grinding, mortising, shaping and many other metal and woodworking operations. Bench and floor models.

RADIAL DRILL PRESS

15 Spindle Speeds: 110-5400 r.p.m. (using an 1140 r.p.m. motor) 160-8300 r.p.m. (using a 1740 r.p.m. motor).

Ball bearing thrust collar carries head and ram assembly —drill can be tilted in either direction, to any angle up to 45°. Drill head, ram and cradle may be swung in a complete circle around the column.

A quick-action lock secures drill in any position, and assures minimum amount of deflection.

The Walker-Turner Radial Drill Press handles all drilling and tapping jobs up to ½" in cast iron with the efficiency of a larger machine where capacity may be wasted on the small job. Particularly valuable wherever large, cumbersome or heavy pieces of work make it easier to move the drill head rather than the work.

SEE YOUR LOCAL DEALER for complete specifications on these and other metal and woodworking power tools in the complete Walker-Turner line, or mail coupon for new catalog.

SOLD ONLY THROUGH AUTHORIZED DEALERS

KEARNEY & TRECKER MILWAUKEE

WALKER-TURNER DIVISION

PLAINFIELD, NEW JERSEY

WALKER-TURNER DIVISION
Kearney & Trecker Corp., Dept. AM8, Plainfield, N. J.
Please send me a copy of the complete Walker-Turner Catalog.

Name.....

Firm.....

Address.....

City.....Zone.....State.....

DRILL PRESSES • RADIAL DRILLS • TILTING ARBOR SAWS • BELT and DISC SURFACERS
METAL-CUTTING BAND SAWS • LATHES • SPINDLE SHAPER • JOINTERS

Specify ALUNDUM Polishing Abrasive

. . . **the abrasive** that will do the job quickly and economically.

- For fast cut on roughing operations — specify S-Treated ALUNDUM abrasive
- For a general purpose abrasive for roughing or finishing, where long life is of primary importance, and for jobs where the wheel is set-up with cement—specify B-Treated ALUNDUM abrasive
- For finishing operations, where glue is used as the adhesive — specify R-Treated ALUNDUM abrasive

For full details on ALUNDUM Polishing Abrasive, and many helpful polishing tips, write for your free copy of, "Setting up Metal Polishing Wheels and Belts."

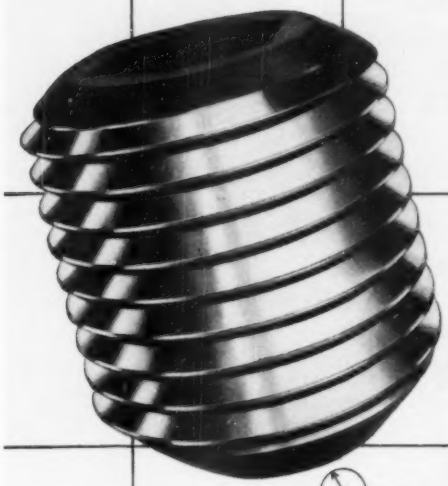
NORTON CO. • Worcester 6, Mass.

Distributors In All Principal Cities

Making better products to make other products better

Parker-Kalon GROUND THREAD Socket Set Screws

Give every department A LIFT



DESIGN

Ground Thread smoothness and accuracy plus faultless thread contour and lead make P-K Socket Set Screws first choice for a high quality product.

ASSEMBLY

Free from nicks, burrs and tool marks, P-K Ground Thread Socket Set Screws are consistently uniform and are made to close tolerances. Therefore they start easy, drive easy — keep assembly humming.

INSPECTION

With a dependable Class 3 Fit, every P-K Socket Set Screw is made of high-grade alloy steel, heat-treated to withstand severe torque and compression loads.

SEND FOR FREE SAMPLES

See and *feel* for yourself the difference thread grinding makes. Try them once, and see why so many Socket Set Screw users are switching to P-K. Parker-Kalon Corporation, 200 Varick St., New York 14, New York.

*TRADE MARKS REG. U.S. PAT. OFF.

SALES

Ground Threads, heretofore available only in precision equipment, provide an extra sales feature any shrewd buyer appreciates.

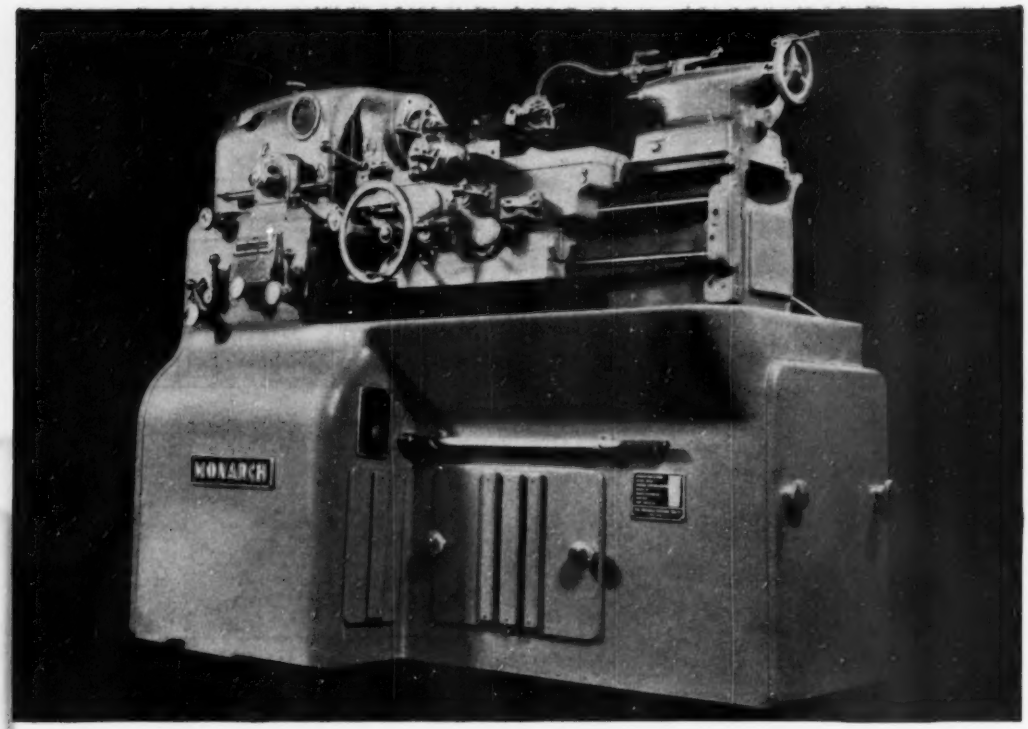
FOR ANY TYPE OF SOCKET SCREW—
REMEMBER—IF IT'S P-K* . . . IT'S O.K.
FLAT HEAD SOCKET CAP SCREWS • SIZE-MARKED SOCKET HEAD CAP SCREWS
• STRIPPER BOLTS • GROUND THREAD SOCKET SET SCREWS • PIPE
PLUGS • HEX KEYS • AVAILABLE THROUGH ACCREDITED DISTRIBUTORS

P-K
Trade Mark

PARKER-KALON*

cold-forged

SOCKET SCREWS



BETTER THAN EVER!

MONARCH'S FAMOUS 10" EE TOOLMAKER'S LATHE

For sensitive precision in the toolroom, no other lathe manufacturer offers a machine with so many exclusive design and construction advantages. These three are typical:

1. *Infinite range of speed changes, ratio 1:100.* No shift, no back-gearing—only rheostat control required for stepless ranges as high as 40-4000 R.P.M. Through a built-in speed reducer this high range may be reduced to 6.5-650 R.P.M.
2. *Variable rapid traverse return* at end of threading cut is available (as original equipment) in connection with electric leadscrew reverse. Rheostat is preset to accelerate return of tool, reducing threading time as much as 50%.
3. *Flame-Hardened, ground bed ways.* By this time-proved Monarch process the wear-resisting qualities of steel are blended in, integral with the rugged cast iron base—for greater accuracy and longer life.

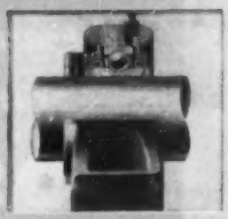
Considerably more than 5,000 Monarch 10" EE Sensitive Precision Toolmaker's Lathes are now in use. Such unparalleled customer endorsement of the basic superiority of Monarch's design, progressively improved since the original introduction of the first EE, is proof that Monarch is your best buy in a precision toolmaker's lathe. For complete details, ask for booklet No. 302.

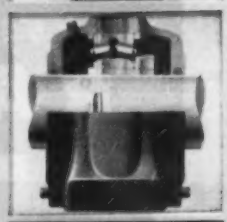
THE MONARCH MACHINE TOOL CO.
Sidney, Ohio

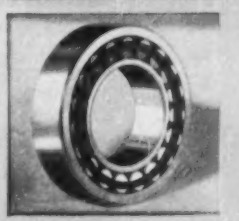
ACCURACY · ECONOMY · LONG LIFE
Monarch
TURNING MACHINES

FOR A GOOD TURN *FASTER* — TURN TO MONARCH

Do You have all these . . . in your bearing specifications?







secure locking

Lock a Link-Belt Ball or Roller Bearing to your shaft . . . without distortion • with firm grip • without mislocation • regardless of rotation • with wide distribution of bearing load

housing seals

LINK-BELT Ball and Roller Bearings are "housing sealed" completely . . . to assure free aligning action • to keep out dirt and moisture • to reduce wear under most severe conditions

outstanding manufacture

even by the strict standards of Ball and Roller Bearing manufacture, LINK-BELT is outstanding . . . because of the most modern precision production • because of quality control

serviceability

install LINK-BELT Ball and Roller Bearings and . . . *let 'em roll* . . .
• they are pre-lubricated • they have a large grease reservoir
• they have correct lubrication

product enhancement

gain these advantages from LINK-BELT Bearings in your product:
• dependability • alignability • high capacities
• interchangeability • quality • LINK-BELT service

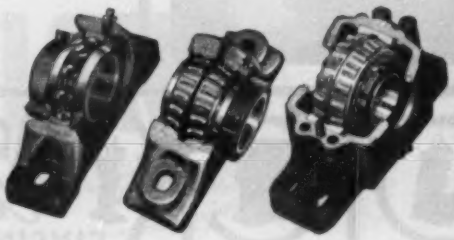
a bearing for every purpose

there is a LINK-BELT Ball or Roller Bearing for . . *every* . . purpose.

An experienced LINK-BELT bearing engineer will go over your bearing requirements with you and make recommendations, without obligation. Send for the complete new LINK-BELT Ball and Roller Bearing Catalog No. 2550.

LINK-BELT COMPANY Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Minneapolis 5, Houston 1, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices, Factory Branch Stores and Distributors in Principal Cities. 11,604

A complete line of bearings is available from stock, throughout the country, in pillow blocks, cartridge, flanged cartridge, flanged, hanger and takeup blocks —also unmounted bearings.



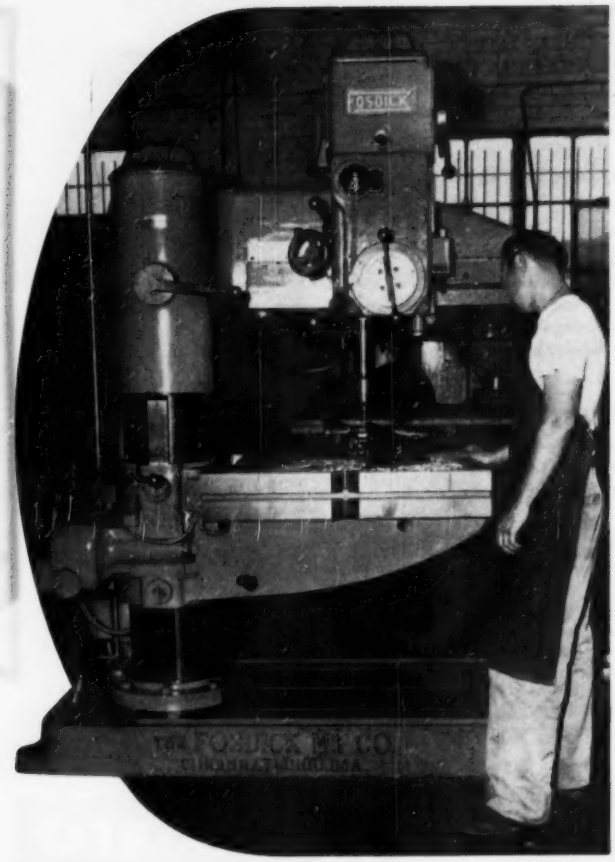
LINK-BELT

BALL & ROLLER

BEARINGS

A practical machine for Sensitive Drilling

FOSDICK SENSITIVE RADIAL



• Where the work is small and numerous holes are to be drilled the FOSDICK Sensitive Radial is an ideal machine. Moderately priced — it is designed to provide maximum production with the least amount of effort on the part of the operator.

For example all controls for feeds and speeds and movement of the head on the arm are centralized on the head for the convenience of the operator.

The Arm is located at a fixed height within easy reach of the operator at all times. In addition to the conventional Radial Drill Base the Machine has an adjustable table. Both the table and the arm swing in an arc of 360°.

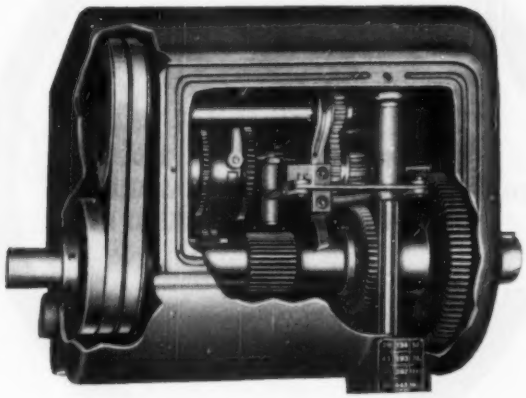
If you have sensitive drilling operations, requiring holes up to 1½ inch diameter you should investigate the Fosdick Sensitive Radial.

Full descriptive bulletin available. Write for Fosdick Sensitive Radial bulletin S. R. A.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

THIS LATHE USES ITS HEAD

to give you full power at all twelve speeds from 28 to 1800 r.p.m.



LeBLOND DUAL-DRIVE

Dual-Drive headstock design combines belt and gear drive to give you the widest range of speeds in the medium-price class—all at full horsepower.

Result? Smooth *full* power at high speeds—ideal for carbide and fine-finish turning. Rugged *full* power at low and intermediate speeds—for fast, efficient rough turning. Add convenient, single-lever speed control and the widest feed range in its class—and you have a lathe that does more jobs, faster, better, easier than any comparable machine.

Sixty-three years of machine tool leadership stand behind LeBlond's complete line of 76 lathe models to give you day-in, day-out dependability. Your nearby LeBlond Distributor will tell you about the Dual-Drive and other late models. Call him or write—

THE R. K. LeBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Sales offices in New York, Chicago, Detroit.

LeBLOND Dual Drive

World's largest builder of a complete line of lathes.

15

DUAL-DRIVE FEATURES

15" swing

Combination belt and gear drive

Twelve speeds from 28 to 1800 r.p.m.

Ninety-six feeds from .0004" to .106"

Forty-eight threads from 4 to 224

Single-lever speed control

Totally-enclosed feed box

Electric brake, forward and reverse spindle control at apron

Single-lever positive jaw feed control

Automatic lubrication through headstock and feed box

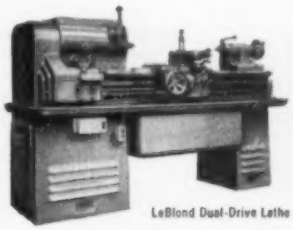
Hardened steel gears and anti-friction bearings

Multiple automatic length stops

One-piece apron

Hardened and ground replaceable steel bed ways

Taper key drive spindle nose



LeBlond Dual-Drive Lathe

FACTS!

THE BLANCHARD WILL ROUGH GRIND LARGE QUANTITIES OF PARTS FASTER THAN OTHER MACHINES *and* **THE BLANCHARD WILL PRODUCE SURFACE FINISHES AS FINE AS ALLOWED BY THE PHYSICALS OF THE METAL ITSELF**

ROUGH GRINDING possibilities with a Blanchard is illustrated by these refrigerator valve plates. 1/16" of stock is removed from both sides of the rough cast iron parts. 44 pieces are ground per load at a rate of 80 pieces per hour (160 surfaces), to limits of ±.002" for size. A No. 18 Blanchard with a Blanchard 30C40 wheel is used.

FINISH GRINDING these valve plates is done on the same Grinder. With 44 pieces on the chuck, a rate of 100 pieces per hour (200 surfaces) is obtained. .003" of stock is removed from each side to limits of ±.002" for size. Surface finish produced on the cast iron is *6 micro inches or better!* A Blanchard 100C15 wheel is used.

Send for your free copies of "Work Done on the Blanchard," third edition, and "Art of Blanchard Surface Grinding."

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY **64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**

Quiet, Durable G.S. Gearing Drives

THE NEW

HAMILTON BEACH *Food Mixer*

Food Mixers take (and often hand out) a terrific beating! Operating at high speeds and under ever-varying loads, the Gearing must be of the finest quality . . and it must be uniformly made to the most exacting specifications. That's why HAMILTON BEACH uses G. S. Fractional Horsepower Gearing for their remarkable new Food Mixer.

HAMILTON BEACH is another of the *many* illustrious names that appear on fine products with Gearing by G. S. In fact, wherever smooth, quiet, durable Small Gear performance is required, *it's a job for G. S!* Here, you get *top talent* . . a big organization seasoned by over 30 years of specializing in the design and economical *production-run* manufacture of Fractional Horsepower Gearing exclusively!

Step up the quality and the uniformity of the Small Gearing you buy. Submit drawings or ask our skilled engineers for suggestions, ideas and cost estimates. This will not obligate you in any way. Find out today why so many of our country's biggest users rely on G. S. for all of the Fractional Horsepower Gearing they need!

SEND FOR FREE *new 6-page folder which illustrates and describes G. S. facilities, Small Gearing and applications together with handy charts for those who specify Gearing from 12 D. P. and finer. Will you ask for it on company stationery, please?*

FRACTIONAL HORSEPOWER GEARS

GS

GEAR Specialties, Inc.

Spurs · Spirals · Helicals · Bevels · Internals · Worm Gearing · Racks · Thread Grinding

2635 WEST MEDILL AVENUE · CHICAGO 47, ILLINOIS

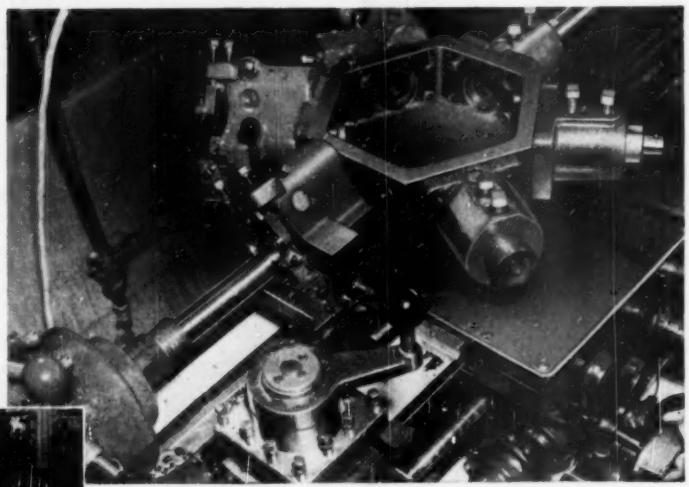
MEMBER OF

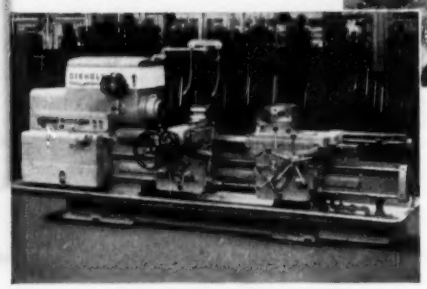
WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS

take shaft jobs Like This:

they take less time on GISHOLT TURRET LATHES

Yes, even in lots as small as 5 or 10 parts, you can't beat turret lathes on this kind of work. Parts are machined complete in 2 operations—total time is less than 4 min.





no extra equipment needed!

With no more than your standard bar equipment, you're all set to cut machining costs on shafts like these. No previous operations . . . such as cutting to length or centering . . . are necessary. And with *two or more tools* from turret and side carriage, you have the basic advantage of turret lathe economy—the time saving that means lower costs.

Before you turn to extra equipment or special attachments, look into the possibilities of doing the job the quick and easy way on Gisholt Turret Lathes. Gisholt engineers will gladly help you.

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY
MADISON 10, WISCONSIN

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

DELTA
MILWAUKEE

Delta-Milwaukee Tool Grinder with Safety Shields (bench model) - - - - - - - $99.50
(floor model) - $124.50

Belt Finishing Machine - - - - - - - $135.45

Carbide Tool Grinder - - - - - - - $170.00

Polishing and Deburring Machine - - - $147.65

Toolmaker® Surface Grinder - - - $400.00

Tool-and-Cutter Grinder - - - - - - - $460.00

Chip-Breaker Grinder - - - - - - - $437.50

Motor and switch extra in some cases.

Prices subject to change without notice.

The Grinder with built-in goggles

Typical of extra safety and extra value from Delta *the most complete line*

NO matter what kind of grinder you need — no matter what the current and speed—chances are you can find it in the complete Delta line. You get extra quality, extra value for your money, and extra safety too — like the Twin-Lite® Safety Shields on the bench model shown. That's why experienced buyers always think of Delta first.

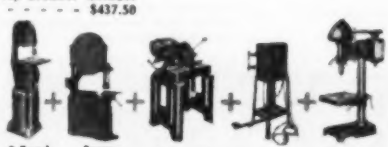
Furthermore, you get the same top quality and wide selection in the other wood- and metal-working machines that make Delta the industry's most complete line — the only line with complete accessories for every tool. Send for complete details.

Sold only through authorized dealers — available on easy time-payments. Look for the name of your Delta dealer under "Tools" in the classified section of your telephone directory.

DELTA POWER TOOL DIVISION
Rockwell
Manufacturing Company
MILWAUKEE 1, WISCONSIN

DELTA • MULTIPLEX • CRESCENT • HOMECRAFT

Plus



3 Band Saws | Sprue-Cutting Saw | 3 Cut-off Machines | 3 Welders | 11 Drill Presses

53 Machines—246 Varieties
And over 1300 accessories

6 Circular Saws . . . 4 Jointers . . . Scroll Saw . . . 4 Radial Arm Saws . . . 2 Shapers . . . 2 Saw-Jointer Combinations . . . Mortiser . . . Lathe . . . 2 Abrasive Finishers . . . Deburring Machine . . . 2 Buffing Machines . . . 2 Planers.

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ROCKWELL MANUFACTURING CO.
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Send me free catalogs and bulletins on the complete DELTA line.

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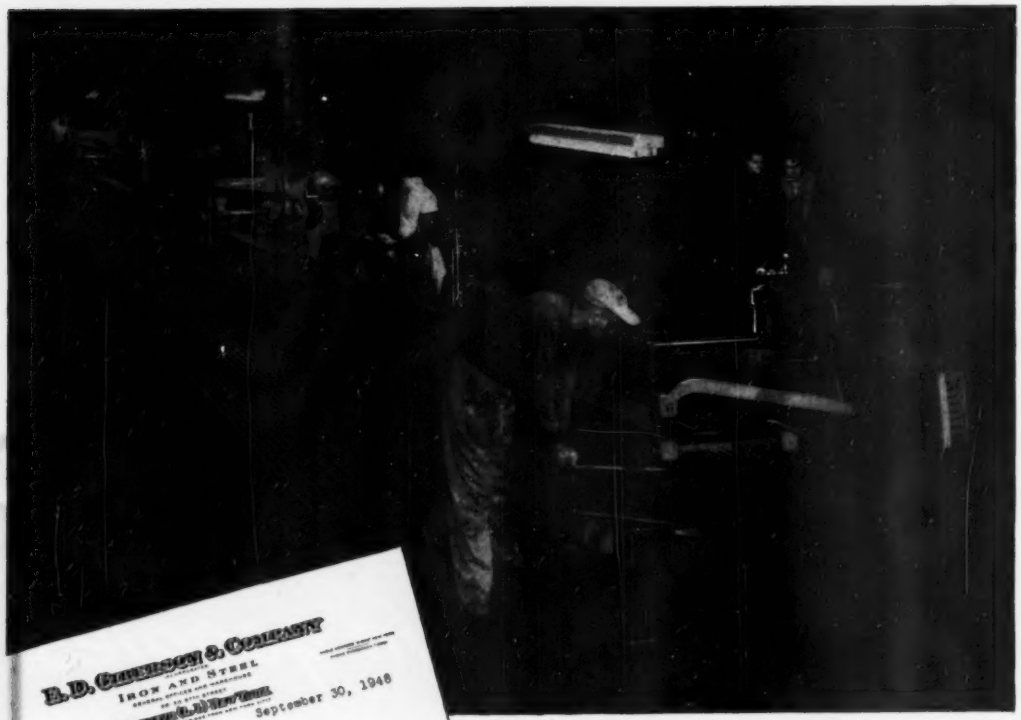


E. D. GIBERSON & COMPANY
IRON AND STEEL

September 30, 1948

Armstrong-Blum Manufacturing Co.,
Chicago, Illinois

Gentlemen:

For almost half a century as direct distributors of Boiler Tubes, Condenser Tubes in seamless steel, electric welded steel and stainless steel, as well as seamless and welded Mechanical Steel Tubing, Seamless Steel Pipe, Stainless Steel Pipe and Tubing, we have cut in our warehouse many million feet of Tubular Steel Products.

The nature of our business necessitates both speed and accuracy in multiple cutting to exact lengths required by customers. When we decided recently to install three more 9A MARVEL Heavy Duty Automatic Hack Saw Machines, it was with full knowledge of their efficiency.

We can assure you of our entire satisfaction with their operation and regard them as valuable additions to our equipment.

Yours very truly,

E. D. GIBERSON & COMPANY, INC.

E. D. Giberson

President

Another Tubing Warehouse "Goes MARVEL"

Warehouses that are not equipped with proper sawing machines find that the cutting of steel tubing (especially the stainless types) is a difficult and costly job. But E. D. Giberson & Company, New York, have cut off millions of feet of all types and sizes of steel tubing to accurate lengths, economically and without difficulty, due to the fact that they have long been properly equipped with MARVEL SAWS. And because they have found MARVEL SAWS so trouble-free, so reliable, so economical to operate and so universally suited to all their cutting-off jobs, they have recently added this row of three new MARVEL No. 9A Automatic Hack Saws. With this additional equipment, they have expanded their facilities and can more promptly serve their fast-growing list of satisfied customers with steel tubing of all types and sizes, "cut to customer's specified lengths."

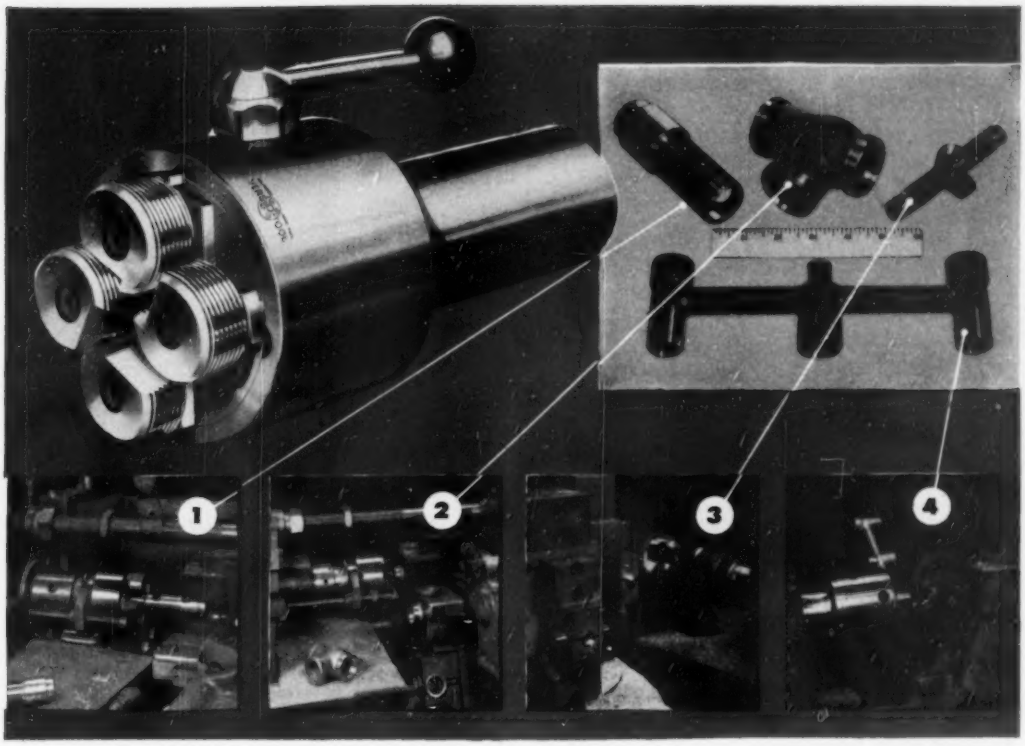
The local MARVEL Field Engineer will be glad to study your range of cutting-off work—whether it be in pipe, structural shapes, bars, or the toughest and largest alloy billets—and will then make recommendations on how you can improve your cutting-off operations to reduce costs and increase man-hour output.

Just write us on your letterhead: "Without cost or obligation on our part, send your local Field Engineer to look over our cutting-off operations."

Metal Cutting
MARVEL SAWS
Better Machines–Better Blades

ARMSTRONG-BLUM MFG. COMPANY

5700 WEST BLOOMINGDALE AVENUE "The Hack Saw People" CHICAGO 30, ILLINOIS



AT REPUBLIC BRASS COMPANY, THEY CHOOSE VERS-O-TOOL

for the tops in dollar performance—in threading production

Faster machining times, lower chaser costs, less tool inventory, greater accuracy—These are just some of the reasons why Vers-O-Tools are the number one choice for fast, economical, precision threading at plants like Republic Brass.

Each of these pluses is directly traceable to the exclusive basic design features of the Namco Vers-O-Tool, including:

CIRCULAR CHASERS—regrindable through a full 270°, for 10 to 50 times longer life.

INTERCHANGEABILITY of chasers, size for size, on all three types of Namco Vers-O-Tool heads keeps tool inventory at an economical minimum.

ACCURACY of thread form, throughout the life of the circular chaser, is assured by exclusive direct micrometer check after each regrind. With Vers-O-Tools you can count on precision threads and smooth finish.

• • •

For complete details on Vers-O-Tool's time-saving, money-saving features, ask for Catalog D-49.

JOB FACTS

1. 1⅜"-18 straight thread—200 per hour—class 2 fit with 1⅝" D.S. Circular Chaser Vers-O-Tool.
2. 1½"—11½ pipe thread—450 per hour—class 2 fit with 1⅝" D.S. Circular Chaser Vers-O-Tool.
3. ⅜" pipe thread—250 per hour both ends—class 2 fit with 1" D.S. Circular Chaser Vers-O-Tool.
4. 1"—20—3 seconds each end—class 2 fit with 1" D.S. Circular Chaser Vers-O-Tool.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

Van Keuren MEASURING WIRES

STANDARD EQUIPMENT...

...everywhere

Measuring the pitch diameter of a 1"-8 National Form thread gage. This method is recommended by the Bureau of Standards.

New New New

NEW CONCEPTIONS
NEW FORMULAS
NEW TABLES

for the exact measurement of multiple worms and screws of unknown profile.

The Fundamental Fact

The axis of a wire resting in a thread assumes a position tangent to the helix passed through the center of the wire and not the point of contact.

Van Keuren Measuring Wires are the accepted standard equipment for making pitch diameter measurements of taps, thread gages, precision threaded parts, hobs, worms, splines and gears. Reputable manufacturers of ground taps and thread gages used for the production and acceptance of threaded holes and nuts use Van Keuren Measuring Wires. You will seldom find them in error if you, too, have Van Keuren Measuring Wires.

This 208 page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies free upon request.

Set No. 20 Thread Measuring Wires is a plant necessity for maintaining taps and thread gages within their limits for wear and for proving the pitch diameter of screws and threaded parts.

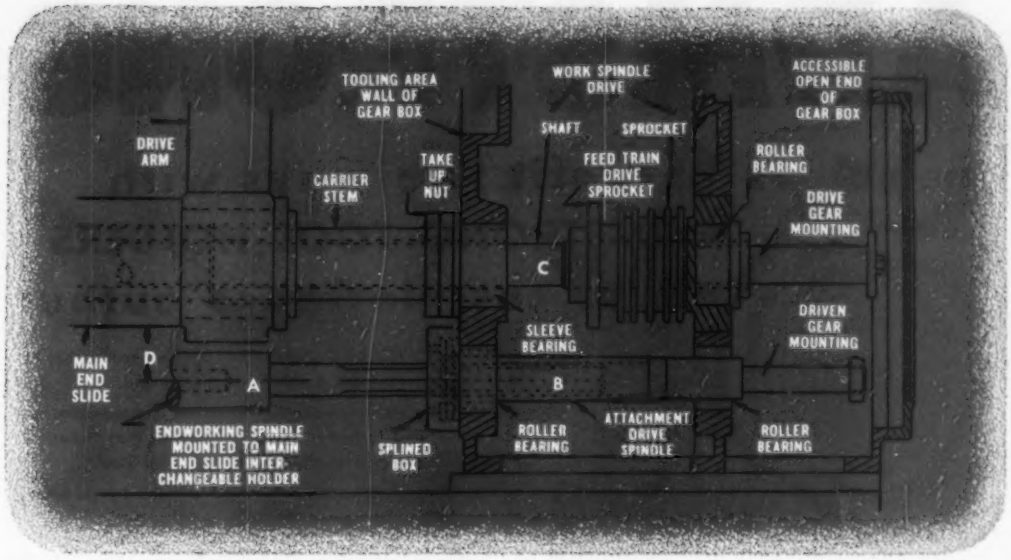
Price, High Speed Steel Wires ..... $ 95.00
Price, Carboloy Wires 240.00

Special wires from .002" to 2.000" diameter are made to any tolerance required.

THE Van Keuren CO., 173 WALTHAM STREET, WATERTOWN, MASS.

31st YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires



BEWARE OF THE BAR IN BARGAIN

With manufacturing costs much the same the country over, the purchase prices of various brands of a given type of machine tool should be about equal for equal value. Healthy competition tends to level out prices.

All of the best facilities of the highest priced machine may not be needed, and should not be expected of the lowest priced machine. The value of any brand depends on how well its facilities meet the particular needs of the individual plant.

Of all required facilities, those of low-cost operation and maintenance are universally considered important. A machine without them is a BAR to any GAIN at any PRICE.

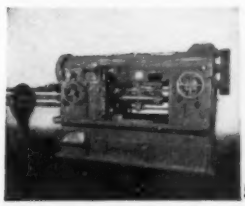
An example of **LOW-COST OPERATION AND MAINTENANCE FACILITY** is the **EXCLUSIVE** Conomatic **"ALL POSITION" END ATTACHMENT,** which has:

1. **Direct Drive to ANY Rotating Tool, in ANY or ALL SIX, Main End Slide Positions. Solid Tapping in ANY THREE Positions on ONE Set-up. Die Head Swing, D, clears COLLET CAPACITY in ANY Position.**

The above drawing shows Endworking Spindle, A, in a Main End Slide Position of a 1½" SIX SPINDLE Conomatic. Its splined shaft is rotated by the Attachment Drive Spindle, B. The drive from the Work Spindle Drive Shaft, C, is indicated. The Spindle, A, rotates in its bearing in an interchangeable Holder mounted to the Main End Slide, whose travel it may take. Three levers and cams offer independent travel to any three Endworking Spindles per single set-up.

2. **Accessible OPEN-END Application and INTERCHANGEABLE Attachment HOLDERS. Selective Speeds and Feeds.**

Six Attachment Drive Spindles may be applied to one set-up. Two are machine equipment. There is drive facility for 168 Speeds between 132 and 6158 RPM for drilling, boring, etc. Std. Drive Gears offer 10 Threading Speed Ratios.



Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

ARMSTRONG

Profit two ways with ARMSTRONG TOOL HOLDERS reduce cost–increase output

ARMSTRONG TOOL HOLDERS are *profitable* because they reduce overhead by saving while increasing output.

- Embodying the Armstrong Principle of an inserted cutter in a permanent drop forged shank or tool holder, they "Save: All Forging, 70% Grinding and 90% High Speed Steel."
- They save machine hours and man hours by permitting higher speeds and heavier feeds.
- They end costly delays for tooling up.
- They increase machining efficiency, for each has been carefully designed, is die perfect in form, is correct in cutting angle, in tool approach and clearance.
- They end tool breakage—have a wide safety factor of strength beyond need.

They reduce tool cost . . . each does the work of a complete set of forged tools and can be bought as needed from your local Industrial Distributor at prices so reasonable that no one can afford to make his own tools. Use the correct ARMSTRONG TOOL HOLDER for each operation on every lathe, planer, slotter, and shaper for increased production and profit.

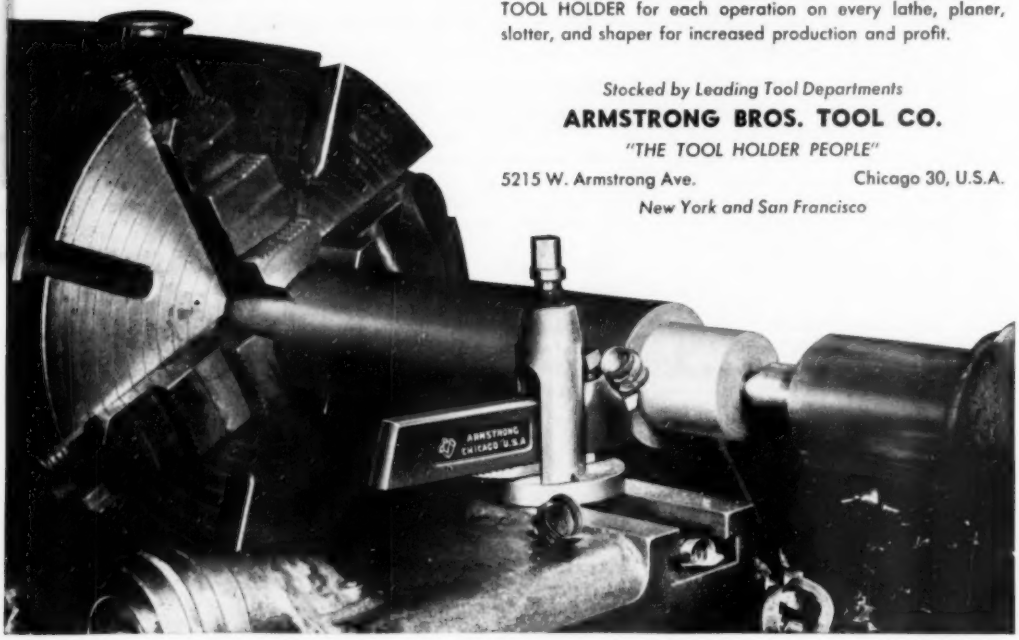
Stocked by Leading Tool Departments

ARMSTRONG BROS. TOOL CO.

"THE TOOL HOLDER PEOPLE"

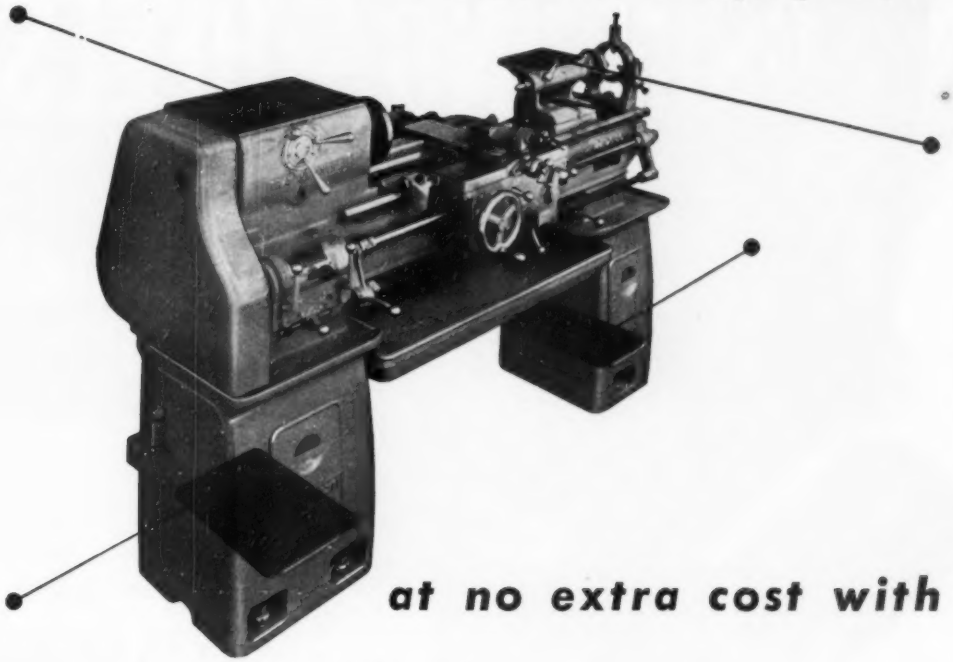
5215 W. Armstrong Ave. Chicago 30, U.S.A.

New York and San Francisco



extra space

is standard equipment



at no extra cost with

tray-top cintilathes

Tray-Top engine lathe operators **get more work done** by having tools, mikes, accessories, etc., instantly within reach, right on top of the headstock and tailstock that gave this light duty lathe its name. No temptation to clutter the bed ways, convenience and safety assured . . . moreover, the spacious cabinet legs **really** have space for the operator to keep accessories safely out from under foot. Bench space requirements are cut or eliminated all together.

Only Tray-Top combines, in one machine, this and other valuable safety and convenience features such as enclosed quick change box, simple three lever "color-match" speed selector, twelve speeds, drop levers, start-stop apron control, long taper key drive spindle nose, built-in leveling jacks, external accessible mounting of main drive motor, low voltage controls (transformer included for 220 volt and over)—make Tray-Top your next buy—it's your best buy.

CINTILATHE

OF OUTSTANDING VALUE

CINCINNATI 9, OHIO, U.S.A. cincinnati lathe & tool co.

INTERNAL GRINDING WHEELS

by CARBORUNDUM

TRADE MARK

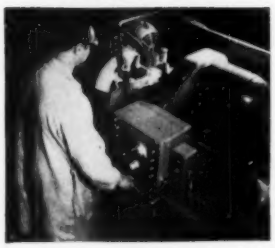
5 BIG ADVANTAGES

1. More pieces per wheel.
2. Faster, freer, cooler cutting.
3. Lighter dressing—longer diamond tool life.
4. Greater range of work from one grade.
5. Improved surface finishes and closer tolerances.

● OUTSTANDING ON DIFFICULT JOBS

Perhaps your internal grinding requires a particularly rugged, durable wheel...or maybe you have a delicate job where ordinary grinding pressures can't be tolerated. On a wide range of work, you can get higher production rates and finer finishes at lower cost with V1 Bond Internal Grinding Wheels by CARBORUNDUM.

V1 Bond Wheels are produced by a special new process that assures wheel uniformity, better grinding action and faster delivery. Machine manufacturers recommend them for high-production, precision work; and many large users depend upon them for consistent quality production. These wheels are also effective in tool-room grinding where cool cutting is essential. Write for complete facts. The Carborundum Company, Bonded Products Division, Niagara Falls, New York.



BRANCH OFFICES IN:

Atlanta	Los Angeles
Boston	Jersey City
Chicago	Philadelphia
Cincinnati	Pittsburgh
Cleveland	St. Louis
Detroit	San Francisco

Bonded Abrasives by

CARBORUNDUM

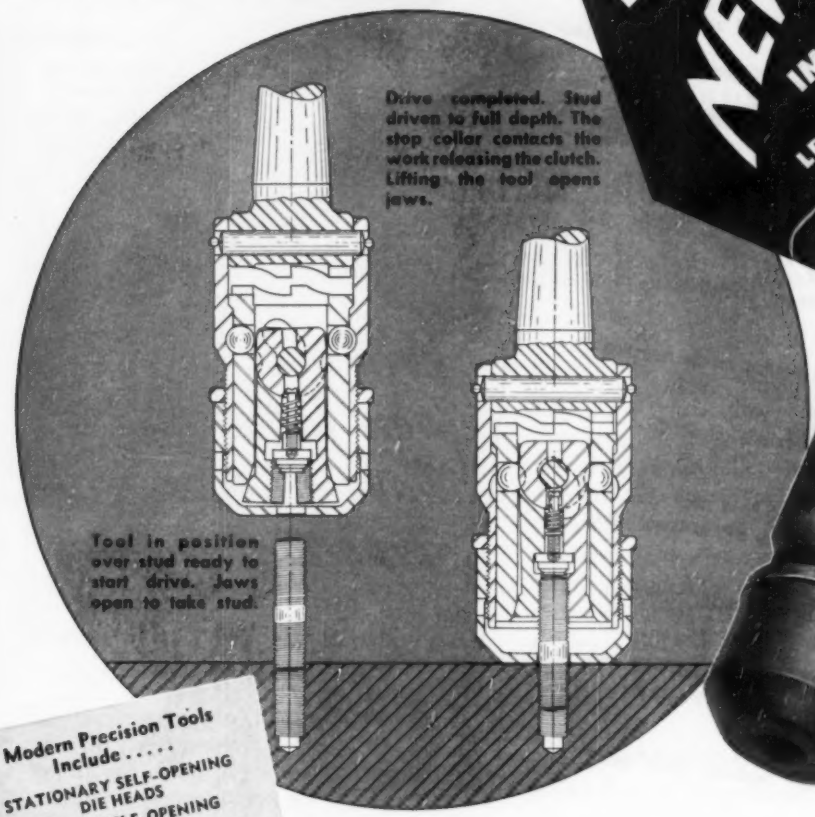
TRADE MARK

Making ALL abrasive products . . . to give you the proper ONE

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

MODERN
SELF-OPENING
STUD SETTERS

NEW
IMPROVED DESIGN
LESSENS COST OF STUD SETTING


Drive completed. Stud driven to full depth. The stop collar contacts the work releasing the clutch. Lifting the tool opens jaws.
Tool in position over stud ready to start drive. Jaws open to take stud.

MODERN STYLE H
STUD SETTER

Modern Precision Tools Include . . . . .

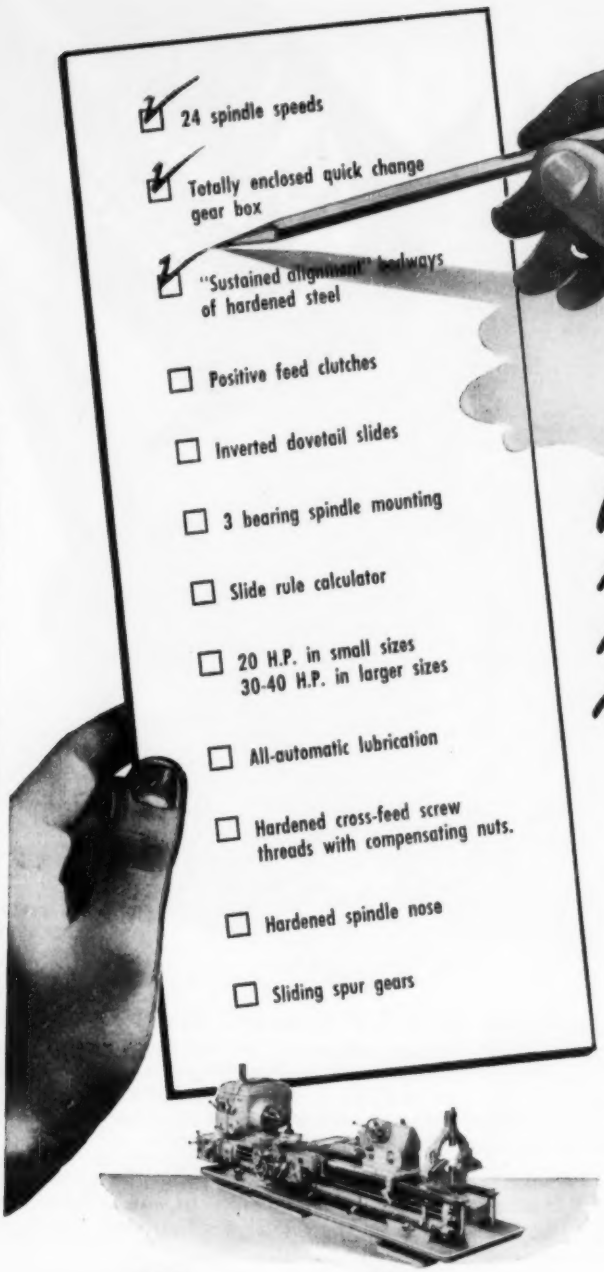
STATIONARY SELF-OPENING DIE HEADS
ROTARY SELF-OPENING DIE HEADS
STATIONARY COLLAPSIBLE TAPS
ROTARY COLLAPSIBLE TAPS
MODERN-MAGIC CHUCKS AND COLLETS
SELF-OPENING STUD SETTERS
INSERTED BLADE FACE MILLING CUTTERS
SOLID ADJUSTABLE DIE HEADS
ADJUSTABLE HOLLOW MILLING TOOLS
UNIVERSAL CHASER GRINDING FIXTURES

Through improved design that insures longer life to the tool jaws and less down time for changes and repairs, this new Modern Style H Self-Opening Stud Setter provides the means to greater economy in stud setting. With this improved tool, it is possible to set more studs . . . in less time . . . at lower cost . . . with a minimum of thread mutilation . . . and with less wear to the tool itself.

Full information covering the advanced construction features and improved action of this new Modern Stud Setter as well as the economy possible through its adoption for your stud setting work, will be furnished immediately upon your request.

MODERN TOOL WORKS

DIVISION OF
CONSOLIDATED MACHINE TOOL CORPORATION
ROCHESTER 10, NEW YORK


24 spindle speeds
Totally enclosed quick change gear box
"Sustained alignment" bedways of hardened steel
Positive feed clutches
Inverted dovetail slides
3 bearing spindle mounting
Slide rule calculator
20 H.P. in small sizes
30-40 H.P. in larger sizes
All-automatic lubrication
Hardened cross-feed screw threads with compensating nuts.
Hardened spindle nose
Sliding spur gears

Will your new lathe have all these important features?

Use this check list to insure Profitable Performance . . .

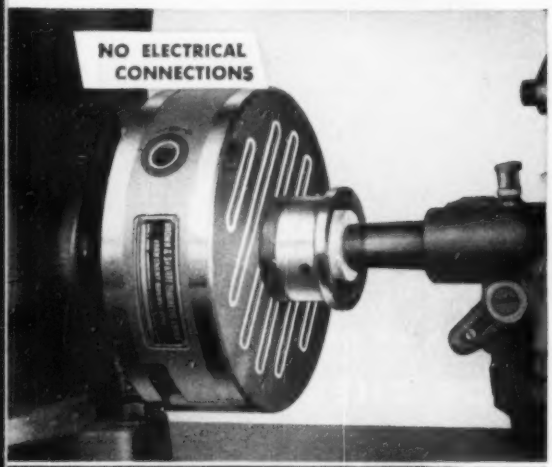
When you buy a new lathe compare all the *important* features. If any of these features are absent you're not getting all the value your money can buy. Check your old lathes, too, against these 12 necessary features. You are probably losing money if they lack any of these latest advantages.

Many of the features shown here are exclusive with Lodge & Shipley, others are not. But—no other lathe—only the Model "X" combines ALL these profit-making advancements.

For detailed information, write today for NEW "Features Catalog #200." Tells you *what* each feature is, *how* it improves or speeds operation and *why* it's important to you. Write, also, for a supply of Check Lists to make your lathe comparisons.

THE **Lodge & Shipley** COMPANY
MACHINE TOOL DIVISION • 3055 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

Powerful Permanent Magnet Chucks



that simplify layout work, testing, inspecting, grinding and light machine operations

Wherever these Brown & Sharpe permanent magnet chucks are in use, time-consuming holding jobs are made easy — economical. By a simple turn of a lever, work is held securely — another turn releases work instantly. The amount of holding power may be varied to permit accurate positioning of work.

With these chucks, no jigs or fixtures are needed. No clamps. No vises. No risk of distorting work through uneven pressure. The chucks are portable . . . instantly usable . . . and will hold work as long as desired without damage to work or chuck because they do not heat. Used for wet or dry grinding.

WIDE RANGE OF TYPES AND SIZES

Brown & Sharpe Permanent Magnet Chucks are available as follows:

RECTANGULAR MODELS, 8 sizes, to 12⅛" x 36".
ROTARY MODELS, 3 sizes — diameters — 5", 7", 9".

Also available . . . auxiliary top plates, magnetic chuck parallels, magnetic blocks with V or plain face and other useful holding aids.

ECONOMY FEATURES

NO INSTALLATION COSTS
NO OPERATING COSTS
PORTABLE • ADAPTABLE
SAFE • LONG-LIFE
SIMPLE TO USE

For sale only in the United States of America and its Territories. Write for Catalog describing operating principles and specifications. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

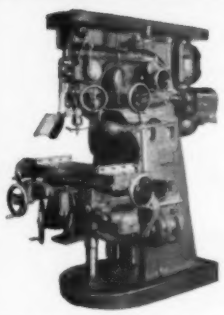
BROWN & SHARPE B·S

ON LARGE DIES... OR SMALL
STRAIGHT CUTS . . . OR CHERRYING

DIES AND MOLDS of *any* shape — large or small — are machined with time-saving convenience and at lowest cost per die on PRATT & WHITNEY Universal Die Sinkers. Take these two jobs for example: both dies are of tough die steels . . . both are profitably machined on the P&W Model 2B Universal Die Sinker with speed and accuracy — including cherrying, regardless of the great difference in size. The Oscillating Head, which generates cylindrical cavities with standard cutting tools, is a built-in feature on P&W Universal Machines — eliminates the need for special attachments.

In shops where the majority of cuts are straight, the P&W Plain Die Sinker is most economical. Where cherrying is frequent, the P&W Universal Die Sinker is the time-saving machine to use. Either way, the name PRATT & WHITNEY is your assurance of precision work, and more of it per day, at the greatest economy.

All operating advantages of No. 2B and No. 3B Die Sinkers — both Plain and Universal — are fully described and illustrated in this Bulletin; send for your copy.



PRATT & WHITNEY
Model 2B
Universal
DIE SINKER

PRATT & WHITNEY
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

"There's no better-paying investment than the Right Tools for the Job"

"no more GAMBLING on tool steel selection"

[½ actual size; Selector is in 3 colors]

Since the first announcement, hundreds of tool steel users have received their CRUCIBLE TOOL STEEL SELECTORS. The comments received indicate that this handy method of *picking the right tool steel right from the start* is going over big.

"Handiest selector I've ever seen"

"No more gambling on tool steel selection"

"You're right, the application should dictate the choice of the tool steel" . . . and many, many more favorable comments.

You'll want your CRUCIBLE TOOL STEEL SELECTOR. It uses the only logical method of tool steel selection—begin with the application to pick the right steel! And the answer you get with one turn of the Selector dial will prove satisfactory in every case, for the CRUCIBLE TOOL STEEL SELECTOR covers 22 tool steels which fit 98% of all Tool Steel applications. ALL the tool steels on the Selector are in Warehouse Stock . . . that means when you get the answer, you can get the steel . . . fast!

Write for your Selector today! We want you to have it, because we know you've never seen anything that approaches your tool steel problems so simply and logically. Just fill out the coupon and mail. Act now! CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

Here's how it works:

To use the Selector, all you need know is the characteristics that come with the job: type and condition of material to be worked, the number of pieces to be produced, the method of working, and the condition of the equipment to be used.

FOUR STEPS—and you've got the right answer!

1. Move arrow to major class covering application
2. Select sub-group which best fits application
3. Note major tool characteristics (under arrow) and other characteristics in cut-outs for each grade in sub-group
4. Select tool steel indicated

That's all there is to it!

Here's an example:

Application—Deep drawing die for steel

Major Class—Metal Forming—Cold

Sub-Group—Special Purpose

Tool Characteristics—Wear Resistance

Tool Steel—Airdi 150

One turn of the dial does it!

And you're sure you're right!!

Crucible Steel Company of America
Dept. A, Chrysler Building
New York 17, N. Y.

Gentlemen:

Sure! I want my CRUCIBLE TOOL STEEL SELECTOR!

Name _____ Title _____

Company _____

Street _____

City _____ State _____

CRUCIBLE

first name in special purpose steels

TOOL STEELS

fifty years of Fine steelmaking

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DENVER • DETROIT HOUSTON, TEXAS • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH • PROVIDENCE ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

choosing the right stock drill cuts tool cost 33%

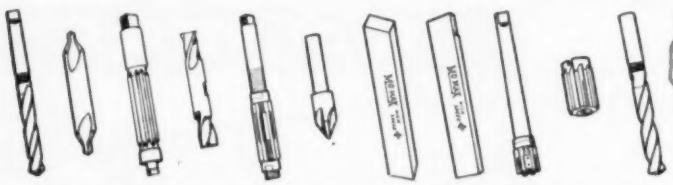
Test Shows This Drill Gives *Best Performance*

The CLE-FORGE High Speed Drill shown here is a regular stock item . . . yet it successfully solved a problem of excessive tool breakage. Recently a *Cleveland* Service Representative was called into a large automotive plant to make suggestions on the proper types of drills for use in portable electric drills. He recommended a switch to the short length CLE-FORGE High Speed Drill. Tests proved that this drill, because of its heavier web and small overhang, gave *33% longer life.* A *Cleveland* Service Representative may be able to help *you* cut tool costs and speed production. Contact our nearest Stockroom, or . . .

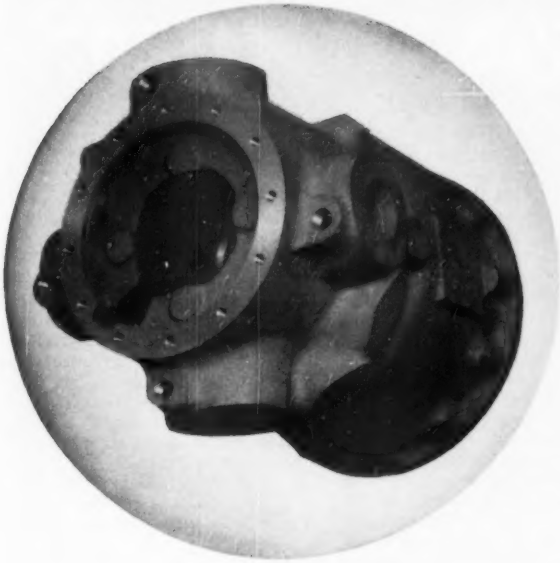
Telephone Your Industrial Supply Distributor

THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street • Cleveland 14, Ohio
Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5 • Los Angeles 58
E. P. Barrus, Ltd., London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER *Cleveland* TOOLS



One a minute-

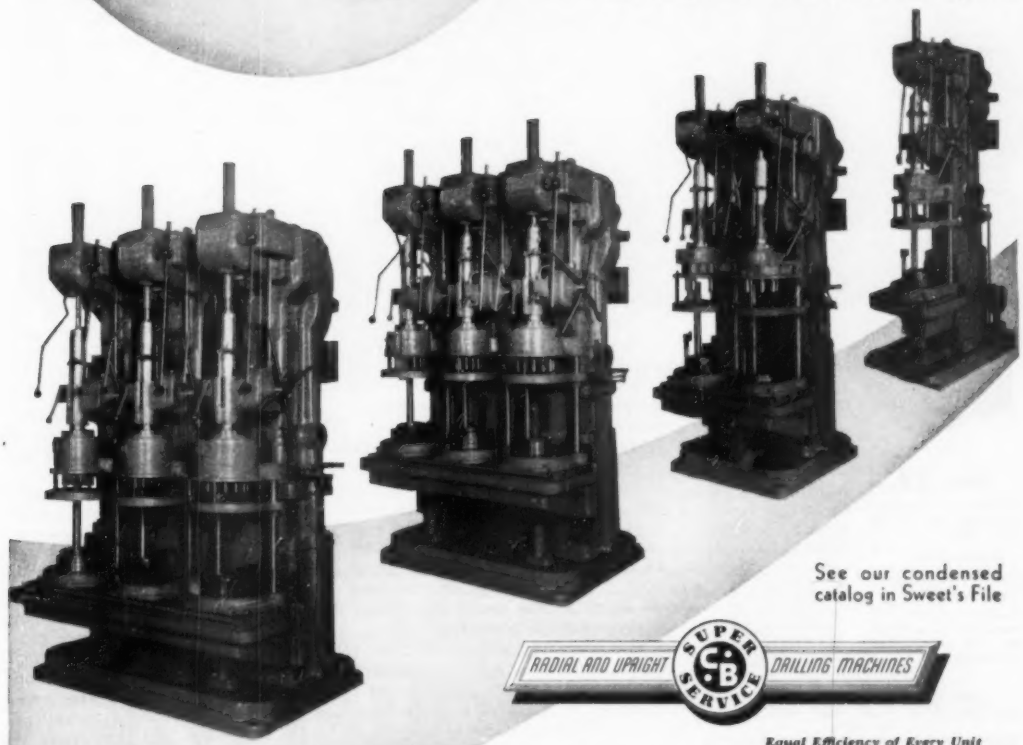


This battery of highly productive 21" and 24" Cincinnati Bickford Super Service Direct Drive Drills is drilling 24—.257" holes; tapping 24—$\frac{5}{16}$" holes; step drilling 4—$1\frac{1}{2}$" x $\frac{7}{16}$" diameter holes $1\frac{5}{8}$" deep; tapping 4—$\frac{5}{8}$" holes in this crank case housing.

The operations are performed on both ends of three sizes of castings. All operations are completed at the rate of one a minute.

These Direct Drive Drilling Machines are made in the following sizes: 21" with 3 or 4 horsepower motor; 24" with 5 or $7\frac{1}{2}$ horsepower motor; 28" with $7\frac{1}{2}$ or 10 horsepower motor.

Write for Booklet U-27 for complete description.



See our condensed catalog in Sweet's File

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. **Cincinnati 9, Ohio U.S.A.**

CROSS UNIVERSAL GEAR MACHINES

for

- ROUNDING
- CHAMFERING
- POINTING
- BURRING

Cross Universal Gear Machines embody advanced engineering developments to obtain highest productivity and assure lowest possible operating costs.

They feature utmost flexibility for handling a wide variety of gears. Continuous cutting motion, exclusive with Cross, speeds production at top efficiency.

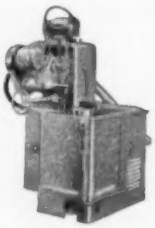
Special skill is not required because machines are automatic and push button controlled. Power clamping is foot pedal controlled. Both hands are free for work handling.

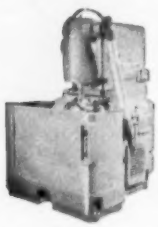
No. 55

For rounding, pointing, chamfering or burring external and internal:

spur gears
helical gears
clutches
splines

Typical productivity when rounding or pointing 8 pitch 30 tooth gears is 55 net hourly.





No. 65

For pointing or chamfering external and internal:

clutches
spur gears
bevel gears
splines

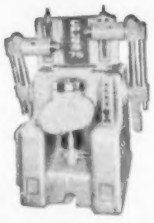
Typical productivity when pointing 10 pitch 30 tooth gears is 100 net hourly.

No. 75

For burring or chamfering both ends at the same time.

helical gears
spiral bevel pinions
hypoid pinions

Typical productivity when chamfering 8 pitch 40 tooth gears is 200 net hourly.



THE CROSS COMPANY
Established 1898
SPECIAL MACHINE TOOLS
MILLING • DRILLING • TAPPING • BORING
TURNING • SHAPING • GRINDING • HONING
DETROIT 7, MICHIGAN

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Good (?) Old Water

Water is always H_2O, but it may carry a widely varying group of chemicals in solution or emulsion. Thus, while water is twice as effective a coolant as oil as you said (*AM*, Sept. 18, p 110), it can be much more than twice as efficient a cause of corrosion. It varies depending on source, frequently varies with the season, may even be acid or decidedly alkaline, may incorporate hardness which will react with the coolant concentrate to cause corrosion.

Again, acid fumes in the air (as, for example, near steel mills burning large quantities of sulfur-bearing fuel, or from pickling baths or chlorinated solvent degreasers) can be absorbed by the coolant, or can act directly to corrode work in process. Still other sources of corrosion are heat treating salts incompletely removed, galvanic action when dissimilar metals are in contact in a solution, or even when two pieces of the same metal are in contact in a solution. Cast or malleable iron, and metals high in sulfur like B-1112 and B-1113 are particularly susceptible to such corrosion.

Whenever metals are machined in water solutions, it is best to rack them separately so coolant is not pocketed and thus prevented from evaporating rapidly. If pieces can not be thus racked, they should be wiped off, blown off with air, or the solution washed off with a water-displacing rust preventive.

Water itself can cause corrosion in a clean atmosphere, particularly in warm weather. The reason is that the hot daytime atmosphere will hold more moisture than the cool night air will (air at 90 F holds about twice as much water vapor as at 70F). Thus the dewpoint is reached at night, so the water vapor condenses to cause corrosion.

Salt from perspiration will cause corrosion, too, as will location near bodies of salt water. So water isn't alone as a cause of corrosion nor need it cause corrosion at all—if you can remove associated causes.

Clyde A. Sluhan
Haddam, Conn.

Training Aid

Are there reprints on "Know Your Hand Tools," (*AM*, May 29, p 85)? This article has been long overdue, and I wish to congratulate you on the thoroughness and practicability of the instruction. I desire one copy now, to serve as a basis for a larger order to follow. We would use these reprints in our die-setter and supervision training program.

Ben F. Revelle
Liaison Tool Eng.
White-Rogers Electric Co.
St. Louis, Mo.

Monday Morning Odor

Henry Ford once said that dirt and filth mean inefficiency. I am reminded of this in reading your Special Report of Sept. 18 on coolants. Many plants clean up the obvious dirt, and insist that men keep clean, but fail to consider a less obvious cause of contamination — coolant sumps. Some sumps are hard to clean, it's true, but unless they are cleaned regularly, other cleaning is vain. If the sump is too hard to clean, or is heavily ribbed so the mixture is not stirred frequently, it may be advisable to replace it with an exterior tank that can be cleaned.

It is bacterial action, particularly while the sump is undisturbed over weekends, that results in generation of hydrogen sulfide. Bacteria of the type found in sumps don't like to be disturbed, hence grow faster over weekends when the machine is not running. Further, the gas they generate stays in solution while the sump is stagnant. When the pump is started on Monday, it's like opening a bottle of charged water; off come the gases, and the stench is what shop men call "Monday morning odor". There are dollars lost here, because many operators start

Eliminate COSTLY SET-UPS!

FEATURES
of a Truly Universal Grinder

1— Internal spindles for small, large and deep hole grinding — speeds from 6,000 to 35,000 R.P.M. All flange mounted, sealed from grit, life lubricated.

2— External spindle has double-row roller bearings for radial load and ball bearings for end thrust — maximum rigidity with no adjustment needed. Lubricated for life.

3— Lathe-type workhead spindle mounts draw-in collets and step chucks directly.

4— Micrometer table stop and fine feed for shoulder and blind hole grinding.

5— Sine bar sets workhead or table swivel for perfect tapers.

with RIVETT'S
TRULY UNIVERSAL HYDRAULIC GRINDER

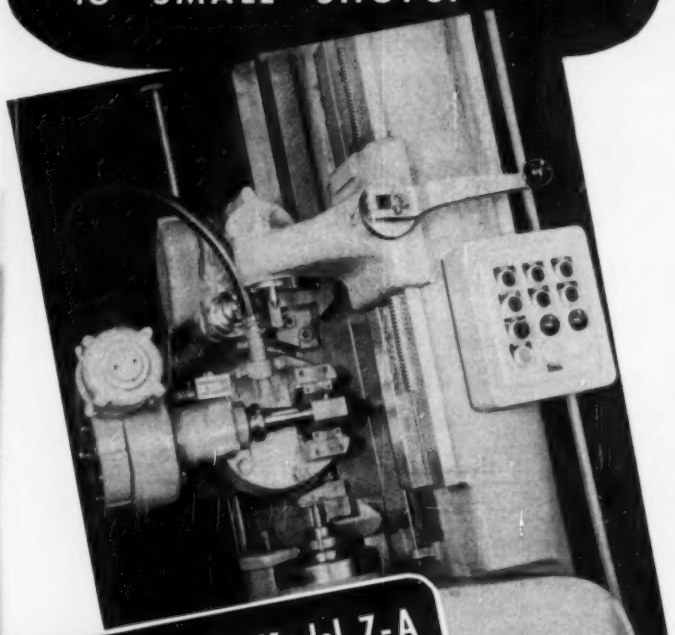
Set-up time, the largest cost item in tool room and small-lot grinding, is reduced to the barest minimum with the new 1024 Rivett—the modern grinder with the truly universal double-end wheelhead. Mounting both internal and external spindles and swiveling 180°, it handles both types of grinding with equal mastery—makes the change to either work in a matter of seconds. So many interesting features are designed into the new 1024 that you'd be well repaid by **writing for Bulletin No. 1024A.**

RIVETT **LATHE & GRINDER, Inc.**

Dept. AMRB, Brighton 35, Boston, Massachusetts

For More Precision Work RELY ON RIVETT LATHES AND GRINDERS, The Master Craftsman's Master Tools

brings "BIG PRODUCTION" ADVANTAGES to "SMALL" SHOPS!



LEES-BRADNER Model 7-A Single Spindle HOBBER

brings you the automatic features and versatility you need!

- Electric Hob Shifter
- Lees-Bradner In-Out Mechanism
- Hobs Splines, Spur or Helical Gears
- 8-inch capacity
- Lead differential (optional) further expands versatility

Why not contact your Lees-Bradner representative . . . request Bulletin A-59s

The LEES-BRADNER Company
CLEVELAND 11, OHIO, U.S.A.

the pump, then go away until the "MMO" has subsided a bit. Actually, in some cases, they have to — or they'd be sick. Disinfectant additions are not the answer here; cleaning and sterilization of the machine on a regular schedule is the only sane answer.

Sterlizing of sumps (see *AM*, Sept. 18, p 116) should be done progressively on a machine line *from the starting end.* Otherwise, work transferred to a sterilized machine from a dirty one will bring contaminating bacteria with it.

Name Withheld

Waste-Control Posters

We contemplate setting up an employee educational program on the elimination of waste materials, perishable tools, and small parts such as nuts, bolts, screws, and rivets.

If you know of any company that makes *stock* posters that may be displayed throughout the plant on bulletin boards on the subject of "Waste Elimination", I would appreciate hearing from you.

D. F. Murphy
Industrial Engineering
Chance Vought Aircraft
Dallas, Texas

Elliott Service Co., Inc., 30 MacQuesten Parkway N., Mount Vernon, N. Y., supplies weekly 17 x 22-in. posters on this and other bulletin-board subjects, including production control and safety. Of course, if you have a creative artist available, he can produce some "home-grown" posters that will do an excellent job.

As background for your planning, get a copy of "Salvage Manual for Industry" (1943) from the Supt. of Documents, Govt. Printing Office, Washington, D. C., priced at 50 cents. Also check campaigns of other companies in current technical magazines such as Factory Management & Maintenance.

Recent successful waste-elimination campaigns have been reported by Stewart Die Casting Division, Stewart-Warner Corp., Chicago, Ill.; Standard Register Co., Dayton, Ohio; and Goodyear Tire & Rubber Co., Akron, Ohio, using the slogan "Whip Waste & Win" to save a million dollars the first year—Ed.

HARDINGE
ELMIRA, N.Y.

HARDINGE collets

for
All Lathes
and
Millers

All Types
All Sizes

STOCK DELIVERY

Standard Draw-in Collets, any type — any size, for your lathes and millers . . . specify HARDINGE and you gain the benefit of 60 years of collet manufacturing experience.

Special Steel

Hardened and Ground - both internally and externally

Heat Treated Threads

Spring Tempered

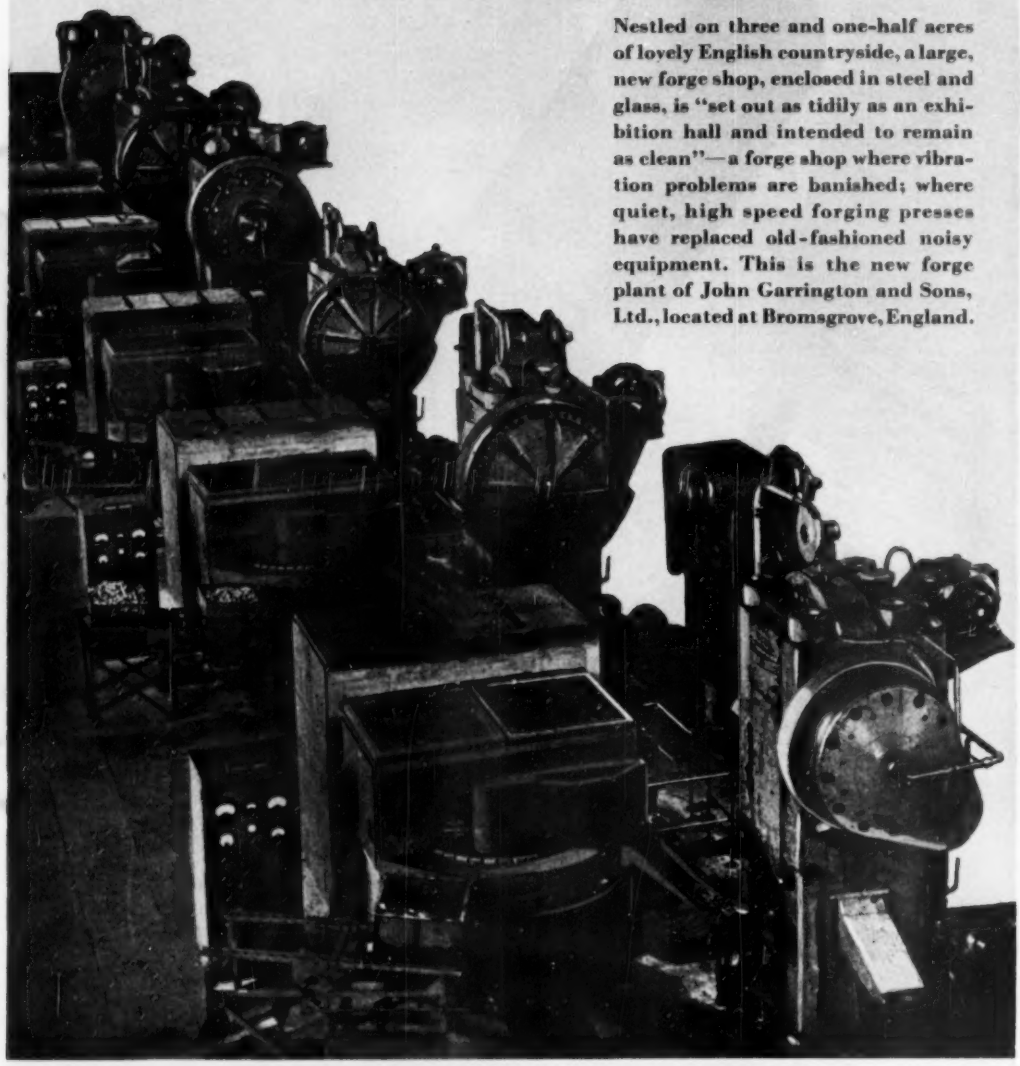
Order HARDINGE Collets for Accuracy - Durability Low Cost

Write for latest Bulletin 50.

FORGING PROGRESS

Garrington's Great New

Nestled on three and one-half acres of lovely English countryside, a large, new forge shop, enclosed in steel and glass, is "set out as tidily as an exhibition hall and intended to remain as clean"—a forge shop where vibration problems are banished; where quiet, high speed forging presses have replaced old-fashioned noisy equipment. This is the new forge plant of John Garrington and Sons, Ltd., located at Bromsgrove, England.



Presses shown above are only part of the battery of twelve high speed forging presses comprising the entire capacity of the Garrington Bromsgrove Forge.

IN GREAT BRITAIN:

All-Press Forge Plant!

This forge shop is equipped only with twelve forging presses, yet it produces 20,000 tons of steel forgings yearly. NATIONAL High Speed Forging MAXIPRESSES were chosen because they are the world's most efficient mechanical forging presses, possessing unequalled rigidity and reliability in operation. Outstanding advantages of MAXIPRESSES over old-fashioned forging equipment include:

1 Higher production

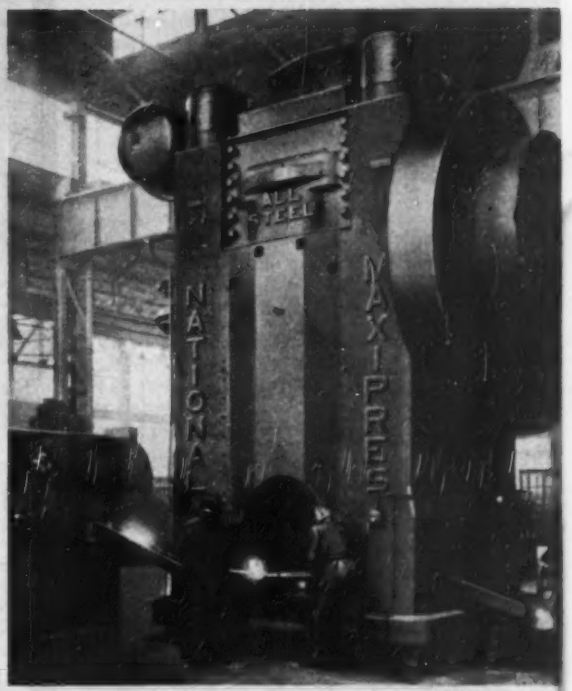
2 Lower maintenance cost

3 Longer die life

4 Less noise and vibration

5 Lower skill requirement

NATIONAL is proud *also* of the part its extensive ENGINEERING ASSISTANCE and SERVICE have played in making this installation a successful one. This is in line with NATIONAL'S long-standing policy of following its machinery through to trouble-free operation.



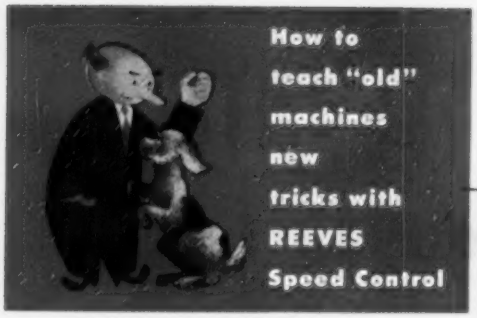
NATIONAL No. 7½ MAXIPRES, weighing 800,000 pounds, in operation in the Garrington plant.

Here is another example of how MAXIPRESSES are used to produce superior forgings at lower cost. Let us help you investigate the application of high speed forging presses to your work. No obligation, of course.

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO.

DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES—MAXIPRESSES—COLD HEADERS—AND BOLT, NUT, RIVET, AND WIRE NAIL MACHINERY

Hartford Detroit Chicago

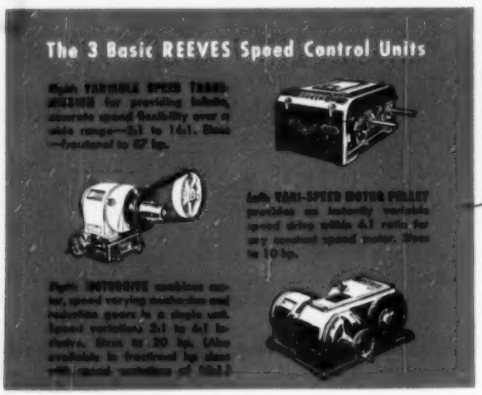


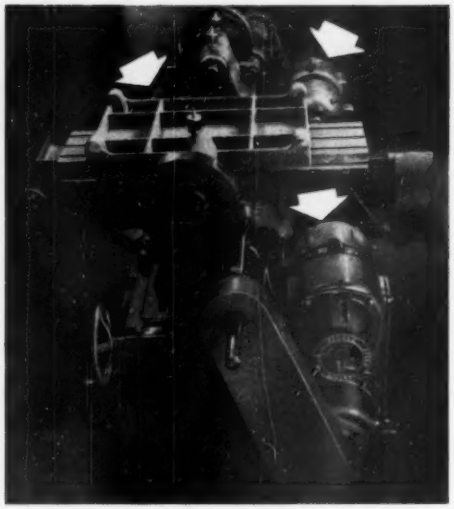
Example: Synchronize parts of one machine, or machines operating in series

Where multiple operations are performed on one machine, or where a hook-up of different machines requires closely coordinated operation, accurate, *positive,* infinitely variable REEVES Speed Control solves every problem of synchronization.

REEVES Speed Control is adjustable "to a gnat's eye" with the turn of a handwheel or touch of a button. It assures a continuous flow of materials at the correct rate of flow from one section of a machine to another . . . or from one machine to another. It cuts down material waste; increases rate of production; insures uniform and improved quality of product; and reduces production cost.

REEVES is the *one* builder of a *complete* line of speed control units. By choosing from the wide range of sizes, designs, capacities, speed ratios and controls, you get a custom-tailored unit at production-line prices. For machines now in service or the new machines you plan to buy, specify REEVES Speed Control. Write, today, for complete information, including the new, 132-page catalog, No. A54-3N.





Synchronized and complete operating control of this Beaman & Smith Duplex Milling Machine is assured by the use of a REEVES Motodrive on each of the machine's two spindles, and by a REEVES Motodrive on the table feed drive. The units on the spindles provide a speed range of 20-120 rpm; and that on the table feed drive, a feed range of 1¾-8⅜ inches per minute. By accurately controlling spindle speed and table feed, REEVES Speed Control not only maintains maximum rate of production on all sizes milled, but also provides running speeds that assure maximum life for the cutters.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized Leader in the Specialized Field of Speed Control Engineering

accurate • variable
REEVES *Speed Control*

Other Uses:

Handle more shapes, sizes and materials • Match skills of operators • Compensate for changes in character of product in process • Maintain uniform peripheral speeds • Maintain uniform pressure, temperature, liquid level, etc. • Assure accurate timing • Closely regulate conveyor speeds.

SPOT NEWS of Metalworking

- **Production of three, maybe more, full-fledged guided missiles** is immediate objective of Defense Department's new guided missile development authority to be set up shortly. Ultimate goal is to develop a family of missiles capable of 95 sure kills for every 100 enemy bombers that may attack. Various services will still be in charge of their own research centers, but a central authority will tell them what to do, and how fast.

- **Lessons learned in Korea may have been worth cost in dollars and cents.** Recoilless rifle didn't pan out to be super-weapon everyone thought. Its accurate range is a few hundred yards at best; muzzle and exhaust blast betray its position with first shot. The lighter, rocket-firing bazooka does same job better, and is easier to supply. The helicopter, first battle-tested in Korea, bettered expectations, so count on increased procurement by all three services. Also, new and improved "walkie-talkie" proved better than anything we had in last war.

Parts-assembly machines will receive more emphasis in mass-production shops in order to improve quality and reduce labor. Example: automatic machine to assemble bearing caps to connecting rods. Uniform torque on nuts will eliminate cause of out-of-round machining for bearing shells; also will permit use of much labor on other work.

- **Detroit has had more than 10,000 migrants from the South since the Korean war began.** Cab drivers say that many of the men get into a cab, before seeking sleeping accommodations, and ask to be taken to a job.

- **Great Britain and Brazil will exchange £96,060,000 worth of goods** in year ending next June 30, £44,620,000 in British industrial products for £51,440,000 in Brazilian agricultural products. Some of the British items: automobiles and parts, £2.5 million; locomotives and cars, £850 million; textile machinery, £4 million; truck and bus chasis, £800,000; steel rods, bars and strips, £700,000; agricultural machinery, £650,000; diesel motors and other industrial motors, £500,000; miscellaneous machinery, £1.8 million.

- **New Burroughs Adding Machine Company plant in Scotland is now turning out all parts** for the whole world's demand for Burroughs electric calculators. When present inventories of American-built calculators are used up, American buyers will get the British-built models. The plant, at Strathleven, already making a large share of parts for other Burroughs machines, is now sending some 90% of its output to America. The plant will be expanded soon to enable Burroughs to produce a brand-new machine, not now made anywhere in the world. U.S. plants would also build this still-under-wraps machine.

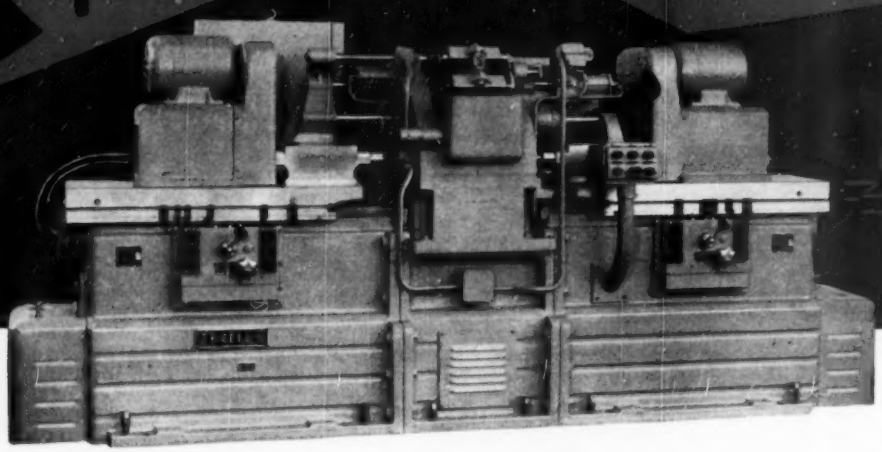
- **Award of war-production contracts to automotive companies is being expedited** by work done by these companies on industrial mobilization orders the past few years. Companies have spent far more in planning and development than such "Phase I" contracts called for, with prospective speeding of the design-to-production cycle as result.

Establishment of a tank arsenal at Kansas City similar to the Detroit Tank Asenal is reported either postponed or abandoned. Chrysler had been picked to operate the arsenal.

- **Tool and die designers may, if they wish, comprise a separate unit for collective** bargaining. NLRB says they are highly skilled technical employees whose work and interests differ from those of tool and die makers, machinists and other toolroom employees. An election among tool and die designers at Quality Hardware & Machine Div., Continental Copper & Steel Industries, Chicago, will determine whether they wish to remove the Machinist Union Die & Toolmakers local 113 as their bargaining agent.

- **Munitions Board frowns on overtime pay. It will forbid overtime** as an allowable labor cost except under these rigid conditions: Item is essential in this emergency; procuring agency head decides it's necessary to meet supply requirements; no other reasonable facilities exist to produce the item in the required time.

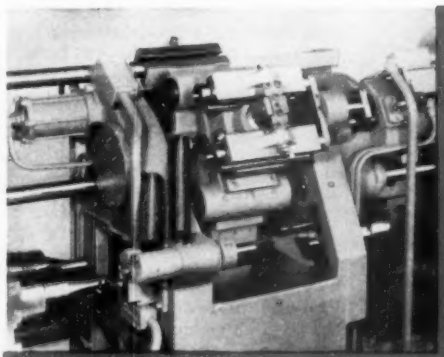
DOUBLE ACTION FOR DOUBLE PRODUCTION



EX-CELL-O TWO-WAY MACHINE BORES, CHAMFERS, AND FACES BOTH ENDS OF TUBULAR STEEL PARTS AT NET RATE OF 366 PIECES PER HOUR!

Ex-Cell-O Way Type Precision Boring Machines save time by machining parts from two or more directions at the same time. And relationship of the various operations to one another is exact because the accuracy is built into the machine—it does not depend on the accuracy of repeated locating and clamping.

The machine illustrated here has a trunnion type indexing fixture, machines both ends of two parts per cycle, ejects the finished work automatically. Have your Ex-Cell-O representative explain all the advantages of these machines to you, or write today to Ex-Cell-O in Detroit for further information.



View of the three-station indexing fixture. Parts are loaded in upper station, machined in lower station, automatically unclamped and ejected from rear station.

EX-CELL-O CORPORATION DETROIT 32 MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS
DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Washington

$45 Billion, $50 Billion, $50 Billion, $30 Billion—That's what mobilization is going to cost the taxpayer fiscal 1951 through 1954. Or at least that's what the Administration is planning.

Next month's second supplemental appropriation request will probably be just a little short of $15 billion, to be added to the $31 billion already appropriated.

After that, in 1952 and 1953—until the end of the "build-up" period—defense will cost just about $50 billion a year. After that it will drop off, unless costs and prices keep on rising.

The level-off rate now being talked is closer to $30 billion than to the $50 billion figure you've been hearing about. It's the old Forrestal preparedness maintenance budget that the Administration shelved back in 1949.

It's the minimum defense chiefs think is necessary to make the West safe from further Soviet attack.

But they're not even sure, now, they'll be able to get that minimum. Voters' demands for a return to "life-as-usual" would be an almost sure result of any prolonged period of relative peace.

The Administration has known all along it would have trouble talking Congress into approving next spring's fiscal 1952 budget, assuming no "police actions" like Korea.

Now they're afraid they will run into trouble even with next month's supplemental request.

• • •

Do-98 Ratings—industry's priority for production equipment, machine tools—are going to be tough to get. Defense has set a low dollar limit on the volume of priority contracts eligible for the special priorities.

Also, the manufacturer will have to show that he's already using existing capacity to the fullest possible extent for rated defense production; and that he's tried every other conceivable way to procure either new or used equipment.

• • •

Army probably won't get the power of direct procurement of ground-support aircraft. Instead "Army" air force will remain administratively under the Air Force, but will be tactically attached to the Army Ground Forces both during training and actual combat.

• • •

Mobilization Chief Symington makes NSRB an operating agency by keeping the certifying authority over who will be allowed 5-year amortization under the Defense Production Act.

However, you make your initial application for quick amortization of new capacity to the department or agency concerned with your particular industry—ICC, Commerce, Defense, Interior, or Agriculture, such as the case may be.

Only those plants decided to be emergency facilities under the law will be eligible. NSRB makes this decision.

• • •

Shortage of metalworking skills has become nationwide. It illustrates lack of skilled labor reserves in industry where defense production is concentrated, Labor Dept. says.

Entire country is looking for machinists, with demand heaviest in Pennsylvania, Kansas and Oregon. Almost 1000 tool and die makers are needed in 26 states.

Turret-lathe, milling-machine and engine-lathe operators jobs can't be filled in 20 states. Hardest hit: Pennsylvania, Connecticut, Ohio, Wisconsin.

Skilled aircraft builders—heavy unfilled demands exist in Kansas and California.

Auto and airplane mechanics, sheet metal workers, electricians, molders and welders are other jobs U.S. Employment Service is trying to fill by recruiting outside local areas.

• • •

NSRB is developing a job training plan. It hopes to keep the Labor Dept. out of actual training. Instead, Labor Dept. would help employers determine their training needs. And Office of Education would direct employer to available training facilities.

• • •

Injury rate in machine shops and metalworking and agricultural machinery plants was lower in the second quarter 1950 compared with the same period in 1949.

Best improvement: machinery shops where the injury frequency rate dropped from 23.5 to 12.7. Agricultural machinery was next—down from 17.3 to 14.2. Metalworking machinery was last, but with an already low rate—from 11.3 to 9.9.

• • •

AFL economists have sent wage negotiators a rundown of the profits outlook in 27 industries. Some of them:

Aircraft—1950 earnings will better previous year "by a good margin."

Machine tools—"Profits should rise well above recent depressed levels."

Metal Fabricating—"Metal shortages will limit output gains." Even so, "relatively good earnings are indicated, even if excess profits taxes are imposed."

• • •

Hamilton Foundry & Machine Co. is one of a few companies that have used the Taft-Hartley labor law successfully to collect damages from a union for violation of contract. The company was awarded $37,500 in damages from the AFL Molders for an illegal strike.

FOR A **FUNCTIONAL** SURFACE FINISH

MICROHONE

a. **CONTROLLED SURFACE ROUGHNESS**
Any desired surface roughness duplicated in every part

b. **NO WAVINESS OR SURFACE IRREGULARITIES**
A true geometrically-accurate surface with no high spots to break the lubricating film and cause high localized heat

c. **A CLEAN-CUT CROSS-HATCH PATTERN (LAY)**
The cross-hatch pattern characteristics of the MICROHONING process is unlike that of any other machining operation. It is free of fragmented, torn or smear metal that will wear or flake off under load.

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Detroit

Washington has served notice on automobile companies that materials will be tighter next year, production cuts likely. How much? That depends on the estimates—not yet completed—of the Munitions Board as to what it will need.

And Munitions Board needs depend, in the last analysis, on Congressional appropriations. Watch for military budgets. The bigger they are, the fewer automobiles will be built.

That was the word out of a session between NPA's Harrison and top auto company brass in mid-October. Steel, all hands reported, is tightest today. Coming into scarce categories: rubber, copper, nickel.

• • •

Credit restrictions on automobiles, meanwhile, are expected by industry people to enforce a reduction in sales. Maybe it'll be severe. If so they may sidestep any need in Washington's eyes for cutbacks on automobile production.

This kind of thing makes no one happy. Said one automotive veteran: "I think this is where I came in. The feel is like 1940 all over again."

Output at this time, however, sails merrily along at its 175,000-a-week gait, cars and trucks, U. S. and Canadian combined. The first quarter brought out 6,300,000 completions. The fourth quarter is positive to push that total over 8 million, despite reductions which are coming in November and December at some plants whose steel embarrassments, like the lady's slip, are showing badly. Good freehand guess of fourth quarter output—1,750,000.

• • •

New models: They're plenty of them being shown. Here are the capsule stories:

Studebaker: A new Commander series with a new V-type, 8-cylinder, 120-hp. engine with 7-to-1 compression ratio (see photo below). The engine can be adapted for higher ratios when better gasolines become available. There are modest redesigns of other Studebaker models.

Hudson: Another new engine, the Hornet, whose name is given a new series of bodies. The 6-cylinder powerplant turns up 145 hp. As an option, GM's Hydra-Matic drive is available on Hornet and Commodore Custom series; Supermatic continues on the Super Custom and Pacemaker groups. Bodywise there are modifications.

Mercury: It can be optionally driven by the industry's newest automatic transmission, the Merc-O-Matic—hydraulic torque converter combined with 3-speed planetary transmission. Horsepower is raised from 110 to 112; the front is facelifted; rear fenders are more streamlined; windows are wider.

Payrolls keep getting larger in Michigan. Those getting unemployment compensation are fewer than any time since the war.

In the light of the need for manpower companies are quietly pleased that men eligible for retirement pensions are still working. Why do they stay on? Full paychecks, inner feelings that they're far from ready for the old rocking chair.

• • •

New plants continue to pop up. Chrysler is building a new transmission plant at Indianapolis, comprising 650,000 sq. ft. Once completed next summer (at cost of $25 million), it'll produce automatic shifting mechanisms—or so goes the industry scuttlebutt.

Buick is building a large new plant at Flint of about the same size. In it will go the new engines on which tooling was recently released.

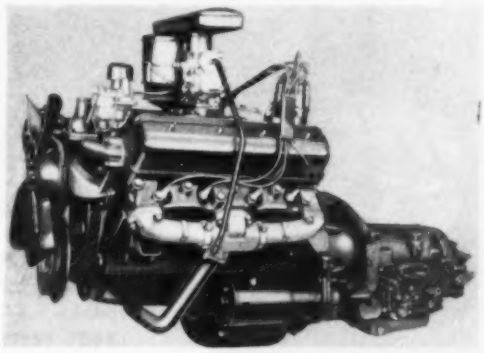
Kaiser-Frazer is putting up a plant at Shadyside, Ohio, across the river from Wheeling, for stamping. The plant has 50,000 sq ft of space.

• • •

Forward buying continues to lengthen out in Detroit purchasing departments. One semi-official estimate: about 18% of all purchasing is being done on a six-month basis, against around 12% in midsummer. Practically no hand-to-mouth buying is done any more; most forward buying is in the two- to three-month range.

• • •

Engineering companies, which flowered fulsomely in World War II, are girding up for business again. The National Association of Engineering Companies is meeting in Detroit Dec. 12 to (1) set up industry policies; (2) expand activities; (3) formulate plans for Washington discussions.



STUDEBAKER'S 1951 Commander series will be powered by this new 8-cylinder, valve-in-head engine. Rated hp is 120 at 4000 rpm. Taxable hp is 36.4. Piston displacement is 232.6 cu in. Bore and stroke are 3⅝-in. and 3¼-in., respectively. Compression ratio as released is 7:1

Precision + LOW COST...

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STANDARD STEEL BLOCKS

CARBLOX CARBIDE

ANGLE BLOCKS

For years Webber has dedicated itself to the production of gage blocks at a price that even the smallest shop can afford.

Quality and precision have not been compromised in this undertaking. Ask those who use them. Write for literature.

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LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

New Tooling

Defense orders are looming importantly for the first time in machine tool bookings. The now familiar DO rating is part and parcel of an increasing ratio of new orders, but confusion still exists because some machine tool buyers don't seem to be familiar with the rules.

• • •

Fact is that NPA's Regulation 2 creates DO orders for materials and not for production equipment. DO-98 has been assigned to the services as a special rating for such equipment. The services then allot DO-98 ratings to defense contractors to secure machines needed to carry out other DO contracts. Such ratings will be doled out sparingly.

Delegation of this authority for machine tool priorities to the military is temporary, until NPA can be set up to do the job. That probably won't be until midwinter. Then the volume of DO contracts eligible for DO-98 ratings is likely to expand.

• • •

Builders are being advised to talk with customers placing DO orders if there is any question about the right of the customers to use a DO rating. Legitimate DO orders are to be filled strictly on the basis of the time the orders were received.

• • •

Machine tool orders in September stayed reasonably close to the August peak. They stood at 283 on the index of National Machine Tool Builders' Association. August figure was 307.3.

October results are not yet known, but bookings are believed to have been close to the September level. Meanwhile, shipments in September rose to 100.5, from 93.7 in August and 68.3 in July.

Incoming business each month is far outstripping output, however. This situation appears likely to continue the remainder of the year.

• • •

Automotive orders to machine tool builders this year will run close to $200 million. That is by far the biggest automotive retooling program in the history of the industry, far surpassing that in 1937.

Orders for automobile retooling still are rolling in. Dodge has decided to enlarge facilities for machining its new V-eight engine and has ordered more machine tools for the job.

• • •

NPA's Machine Tool Advisory Committee, consisting of 18 members, held its initial meeting in Washington Oct. 25. H. B. McCoy, assistant NPA administrator, is committee chairman. Alexander Keller, former vice president Pratt & Whitney, has been proffered the job of full-time machine tool consultant to NPA's Machinery Division.

• • •

Inventory of used machine tools in hands of dealers and rebuilders is being taken at request of NPA by Machinery Dealers' National Association. Guess is that total is around 60,000.

Used machinery dealers are campaigning hard for Washington approval of plan for rebuilding large numbers of surplus tools owned by armed services. Builders of new machine tools are too busy to do rebuilding jobs unless services insist.

• • •

Machine tools taken from reserves of armed services must be replaced, according to policy now in force. Replacement is not necessarily with a new machine. Air Force is said to be last of three services to adopt this policy.

• • •

Most machine tool companies are running 48 to 50 hr. a week on two shifts. Some are up to 58 to 60 hr. It's almost impossible for builders to get skilled help. In fact, automobile makers are luring present employees away from the machine tool industry with promises of higher pay.

• • •

Materials shortages plague machine tool builders. Steel plate, in particular, is a problem. One company is getting Belgian plate shipped in through New Orleans by boat. Certain builders predict layoff in their plants in 60 to 90 days if they don't get more steel.

Castings likewise are causing anxiety. Terrific burden has been thrown on foundries serving machine tool industry. These foundries are short of men and are farming out orders to other foundries to try to meet delivery dates.

• • •

Machine tool output this year should total $300 million. Next year it should be $500 million at a minimum and probably will be somewhat higher.

• • •

Two tooling programs are in prospect at the Ford aircraft engine plant in Chicago, formerly the Dodge-Chicago plant. Neither has reached the inquiry stage.

Huge numbers of machine tools will be required and it appears unlikely that production will be under way at a reasonable level before the middle of 1952.

• • •

General Electric is said to have ambitious plans for expansion of jet engine work at Lockland, Ohio, with some $20 million tagged for new machine tools. The Air Force, however, has compelled GE to scour surplus government stocks for usable machines prior to placing orders.

When you specify Carboloy Tools you get Maximum Productivity!

The uniform high quality, consistent performance and long life of Carboloy Tools assure you of

- ★ Maximum production per machine
- ★ Maximum machine speeds
- ★ Maximum adherence to tolerances
- ★ Maximum tool life
- ★ Maximum pieces per tool
- ★ Minimum number of rejects

. . . advantages that add up to maximum productivity — plant wide.

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OF YOUR MACHINING

with this team of 11 styles of low-cost Standard Carboloy Tools

THAT'S right! This versatile team eliminates the need for a large, costly inventory of special tools.

These 11 low-cost styles are adaptable for up to 80% of your single-point tool machining operations. For special applications, these tools can be quickly, economically ground in your own tool room to meet your specifications.

Here are three other big reasons for choosing Carboloy:

Universal Use—can be used in lathes, boring mills, etc., to machine any metal or nonmetal; for hundreds of single-point tool machining operations. Suitable for job lots or quantity production.

Low Cost—versatile Standard Carboloy Tools are comparable in price to many high-speed steel tools, and in many sizes are actually cheaper. Mass-produced under rigid quality controls to give you the highest quality at low investment cost.

Greater Availability—Authorized Carboloy Distributors in 93 cities, coast-to-coast, carry stocks of Standard Carboloy Tools. In most areas off-the-shelf delivery of most styles and sizes normally can be made.

And you can add the advantages of simplified ordering, easy selection and versatile grades, plus the extra assurance that in the Carboloy brand of tools you get uniform quality in *every* tool . . . in *every* order . . . in *every* regrind.

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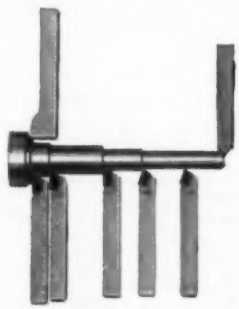
HERE'S ADAPTABILITY . . .



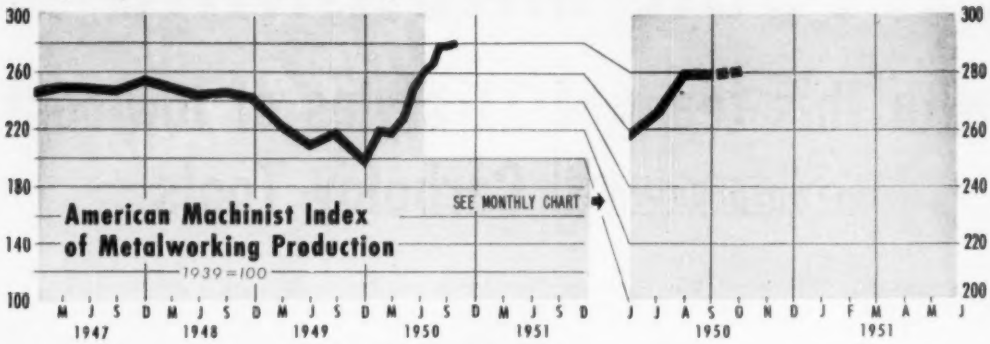
Here's how 4 styles of low-cost STANDARDS do the work of 7 specials

A tool problem on a rush order was solved by quickly adapting these 4 styles of low-cost Standard Carboloy Tools to do the work of 7 specials. Proof that it pays to standardize with Carboloy Standards!

"The least number of tools for the greatest number of jobs"

IT PAYS TO STANDARDIZE WITH
STANDARD
CARBOLOY TOOLS
13,000,000
USED BY INDUSTRY

Gaging Metalworking



Big Backlogs Lessen Effect of Credit Curbs

Backlogs for both durable and consumer goods are so big that recent credit curbs on retail buying are not expected to affect production during the fourth quarter.

The real worry is not sales. It is two-fold: materials and manpower. In some industrial centers manpower headaches are causing more trouble than materials.

Mass-production industries have drawn skilled men away from the smaller job shop industries. Example: The new Ford transmission plant at Cincinnati has taken men from local machine tool companies.

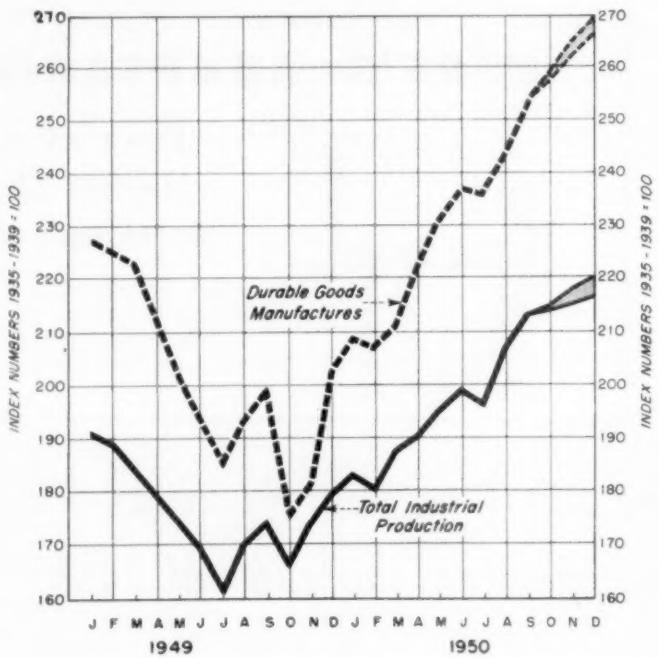
• • •

The steel situation is getting even tougher. Certain users were told recently that they should give mills immediately their needs for second quarter of 1951. Tonnages promised during the current quarter are to be delivered in the first quarter of next year.

PRODUCTION SOARS TOWARDS NEW PEAK

Source: Federal Reserve Board. Estimates for year's end by McGraw-Hill Department of Economics.

1949	Industrial Production	Durable Goods Manufacturers
Jan.	191	227
Feb.	189	225
Mar.	184	223
Apr.	179	212
May	174	201
June	169	194
July	161	185
Aug.	170	193
Sept.	174	199
Oct.	166	175
Nov.	173	181
Dec.	179	203
1950		
Jan.	183	209
Feb.	180	207
Mar.	187	211
Apr.	190	222
May	195	231
June	199	237
July	196	236
Aug.	207	243
Sept.	213	254
Oct.	214-215	257-259
Nov.	215-218	262-265
Dec.	216-220	266 270



INDEX

	OCT. '50	SEPT. '50(p)	AUG. '50(r)	OCT. '49
	281*	279	279	214
Machinery	248	251	193
Electrical Manufacturing	312	321	241
Automobiles, Trucks	265	264	203
Transportation Equipment	286	279	231
Other Metalworking	303	303	230

AMERICAN MACHINIST'S INDEX OF METALWORKING PRODUCTION is based on manhours worked in the five components above.

*Estimated (p) Preliminary (r) Revised

Mills, meanwhile, are raising prices. Certain sizes of some steel products are not being made, thus forcing substitution by users. Plates probably are the worst item of all.

A steel price boost of 6%-10% is expected by December. It's the first industry-wide increase since last December. Rising costs, anticipated wage boosts are blamed. Some unions are now talking about an increase of as much as 20¢ per hour.

The familiar "expediters" of World War II again are visiting steel mills and machine tool plants.

Many steel users are telling customers that they will be glad to fill their orders if the latter will furnish the steel.

• • •

The AMERICAN MACHINIST Metalworking Index leveled off in September, but it should start upward again in October.

Biggest September gain was in the Other Transportation group. The defense effort is pushing up production of airplanes and freight cars, and increasing overhauling of ships.

Freight car builders had orders for 106,661 units at end of September, up 84,458 units over this time last year.

• • •

Expenditures for new plant and equipment in metalworking are headed upward. And much of the outlay will be for long-term projects for expanding facilities for making civilian goods. Example: one metalworking company plans to invest over $200 million in two or three new plants for production of consumer items.

• • •

Several important managements in metalworking are thinking in terms of a 1951 national production averaging 220-230 on the Federal Reserve Index of industrial production. They estimate that a further boost of 10-20 points will occur in 1952, when defense operations gain momentum.

• • •

Durable goods demand is not affected, of course, by recent credit curbs. Turbines and generators are being placed by utilities at a great rate. One producer reports its turbine capacity taken up well into 1952. Manufacturers have been snowed under with orders for medium-size motors and electric controls.

Considerable defense business is expected to break in the automotive industry the next few weeks. Some is hush-hush, being on the top-secret list.

Much of this business will be industrial mobilization orders worked up by private companies under contract to the government the past few years. Washington restricted payment to $12,500 on Phase 1 of each order. But many manufacturers spent many times that amount to have production planning ready when required.

Some Detroit district plants are now getting into production on projectiles.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	222.3	222.6	161.6
Steel ingot operations (% of capacity)	102.0	101.6	9.3
Electric power output (million kilowatt hours)	6,509	6,514	5,481
Production of automobiles and trucks	175,909	177,853	146,566
Engineering construction awards (Eng. News-Rec.; million)	$260.8	$156.7	$121.5

QUARTERLY BUSINESS INDICATORS

	Latest Quarter	Preceding Quarter	Year Ago
Gross national product (billion)	$282.0	$269.9	$254.6
Expenditures on New Plant and Equipment (million)	$5,060	$4,333	$4,370
Profits after taxes in primary iron & steel industry (million)	$281	$199	$166
Profits after taxes in machinery industry	$265	$190	$209
Profits after taxes in electrical machinery industry (millions)	$144	$129	$ 72
Profits after taxes in motor vehicles and parts industry (millions)	$490	$322	$265
Motors and generators new orders index (1936 = 100)	337	338	240

*Seasonally adjusted.

STEP UP PRECISION PRODUCTION... FOR LOWER COSTS

Every MORRIS MOR-SPEED Production Machine represents a manufacturing problem transformed into a routine operation, performed with time and labor saving speed and ease.

This adaptation of a standard type MORRIS Production Machine combines drilling, countersinking and taper reaming operations on an end cap for a large appliance manufacturer. Parts are automatically clamped in position with a power wrench, after which the three operations are performed automatically, in sequence on each of three lead holes. The separate coolant system, with removable chip basket, makes chip removal quick and easy.

If your work requires drilling, reaming, tapping or similar operations, on a production basis, MORRIS Machine Tool engineers will gladly show you how much can be saved . . . in time, money, effort and space . . . by a MOR-SPEED Production Machine.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

The National Interest Comes First

This is the time when the national interest should come first. But what do we find? Wherever we go, we see the national interest subordinated. Selfishness rules.

Let's start with Washington. Politics has been the order of the day. Decisions have been made, or postponed, with an eye on election day.

The result has been the compounding of confusion. Never have so many federal department heads been so bewildered as they are now. Meanwhile the defense program is delayed. And some wonderment is expressed whether the administration is in earnest in waiting to carry through with the stiff measures already announced.

WHILE WASHINGTON fiddles, much of industry has the same indifferent attitude as Washington. Too many manufacturers are going on the theory that we can have all the guns we need and all the butter, too.

They want to segregate whatever defense contracts come their way and put them in one corner far away from their regular work. Major attention is being focused on "Business as Usual." Manufacturers tooling up for production of new models of civilian goods are hounding equipment builders for deliveries. They don't want defense orders, or anything else, to clog their delivery channels. They demand that steel tonnage for defense contracts be added to their normal allotments. It must not be taken out of present reduced quotas.

This spectacle is hardly inspiring. And it is hardly in keeping with the noble words which have been mouthed about our lofty national and international objectives. Clearly, a better understanding is necessary of the job that we face.

NOTHING is to be gained by cutting output of civilian goods just for the sake of our being committed to a defense program. In fact, great harm can be done by slicing production before the defense effort is able to take up the slack.

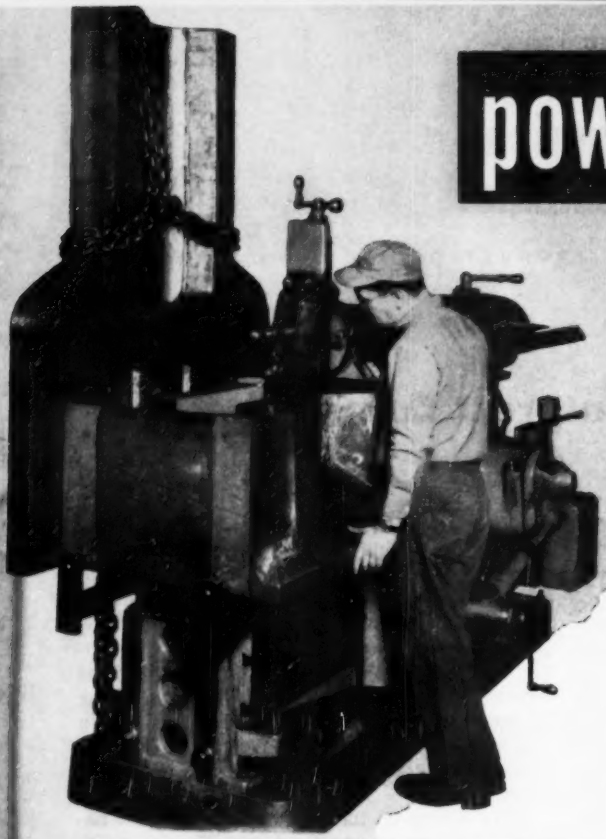
We should, on the other hand, face up to the big job ahead of us. We should not try to pretend that it can be done without sacrifices. We should proceed on the basis that the sooner we prepare our defenses, the earlier we shall be able to resume full production of peacetime goods.

IT IS UP to Washington to provide the leadership essential to carrying out the proposed program without further pussyfooting. Industry rightly is taking its cue from government. Where the government takes the required action to hasten the transition to a semi-war economy, industry will fall into line.

But industry and the people are waiting for Washington to act. It is time our federal government demonstrates convincingly that it considers the national interest paramount. Let's put politics on the back of the shelf until we get the defense job done.

Burnham Finney

powerful!



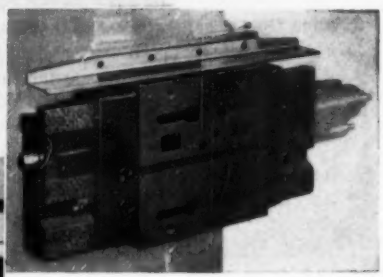
Jobs like this 5300# weldment are easy on a Cincinnati

Cincinnati Shapers are powerful and dependable...

Cincinnati Shapers handle very heavy work—are powerful metal removers. They are dependable and trouble free on the most demanding jobs.

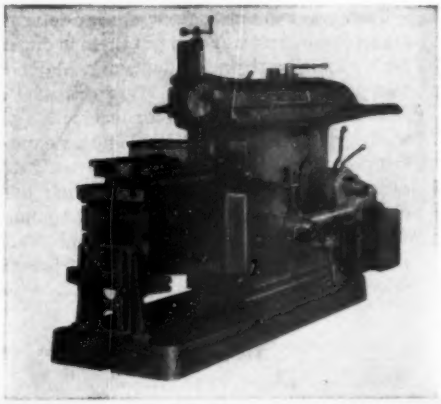
The extra long feed of the Cincinnati tool slide gives the needed range to shape the long blind hole of this large weldment. Dovetailed tool slide and accurately gibbed ram, with extended bearings, prevent chatter under these severe conditions. Table feed and power rapid traverse operate smoothly even with this 5300-lb. load.

Cincinnati Shapers work to close limits and are profitable in both tool room and production departments.



This massive cross rail securely supports the apron on three automatically lubricated bearing surfaces. All controls are at the operator's position. The cross rail is square-locked to the column and automatically lubricated. Alignment is maintained by taper gibs.

This sturdy table support has the sliding action at the table and is gibbed to maintain alignment. Sliding surfaces are completely protected against dirt.



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THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

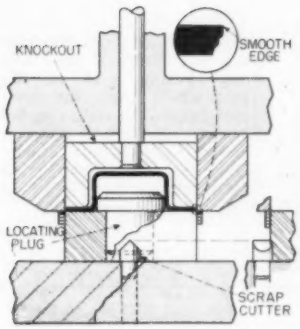
SHAPERS · SHEARS · BRAKES

CINCINNATI

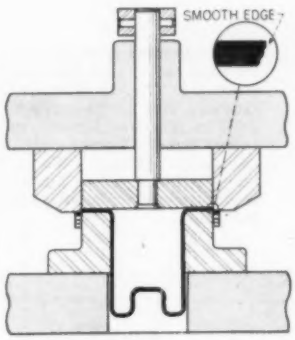
HOW TO CHOOSE TRIM DIES FOR DRAWN SHELLS

Shell edges are trimmed to hold height dimension and to produce a smooth rim ... Seventeen kinds of trimming tools are sketched for your selection ... The choice depends on size, nature and assembly requirements of the work ... Always bear in mind which side of the shell wall requires a smooth edge

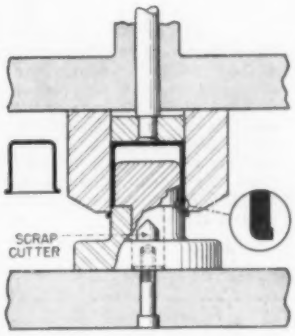
By J. R. PAQUIN, TOOL ENGINEER, TORRINGTON MFG. CO.



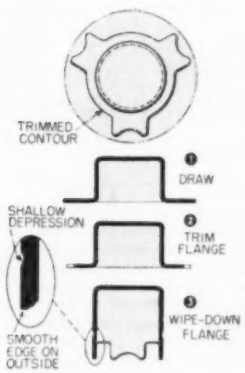
Inverted die trims flange on shell placed upside down on a locating plug. Smooth edge is toward shell bottom; burr side at top. Scrap rings accumulate around lower punch, are split by cutters positioned at front and back. Halves are thrown sideways



Smooth edge is at top of the shell, when it is placed bottom end down in an inverted die. Burr-side direction is very important in many assemblies. Before any work is done on the die design, the engineer should investigate the part function

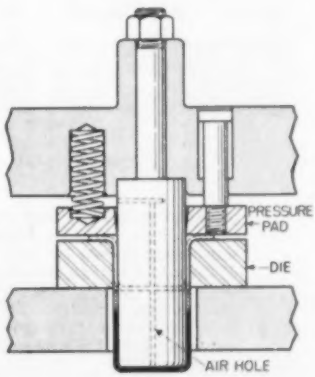


Flush trimming leaves a radius at inner edge of shell, a good condition when parts must be closely fitted into it. A slight projection is left on the outside rim as a result of clearance between punch and die. Shells to be flush trimmed are drawn with a slight flange

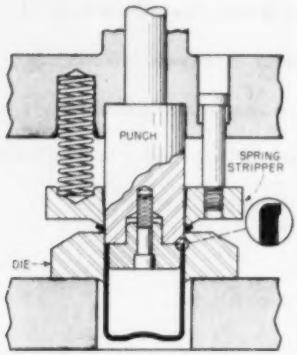


←**Wipe-down trimming** is an economical way of producing a shell with irregular edge contours, and is satisfactory if a slight depression around the periphery is not objectionable. Steps are: 1—draw flanged cup conventionally; 2—trim irregular contour on flange; and 3—Place part in drawing die to wipe down flange, using original die for low production or a new die for high production

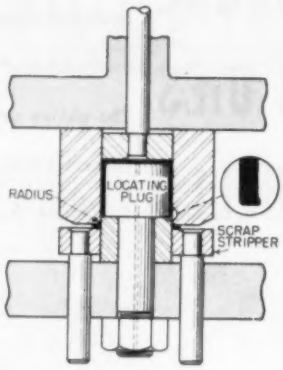
To wipe down the trimmed flange, the flanged shell is placed bottom end down in a drawing die. Upon descent of the ram, a spring-pressure pad applies drawing pressure to the flange while the punch forces the shell through the die. When the punch ascends, the sharp edges on the lower side of the die strip the shell. Slight depression occurs on shell exterior at flange radius



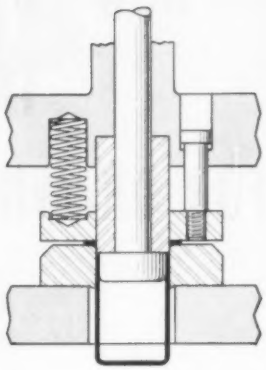
TRIM DIES FOR DRAWN SHELLS *continued*



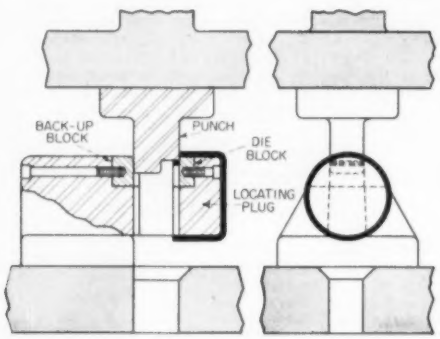
Deep shells are flush trimmed without need of unduly long die members, when the part is placed bottom end down in the die. The shell is trimmed between the die and the punch, and the scrap ring is stripped from the punch by a spring stripper. Again, a round inside edge is secured



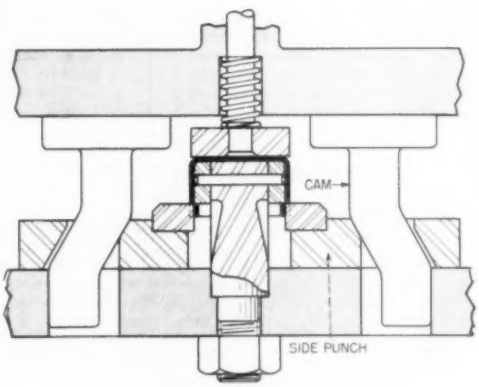
Pinch trimming produces a better edge on the part than flush trimming. The die opening is radiused, and the flange on the shell is pinched between this radius and the cutting edge on the punch. While the flange is being cut, the radius tends to iron the metal against the locating plug



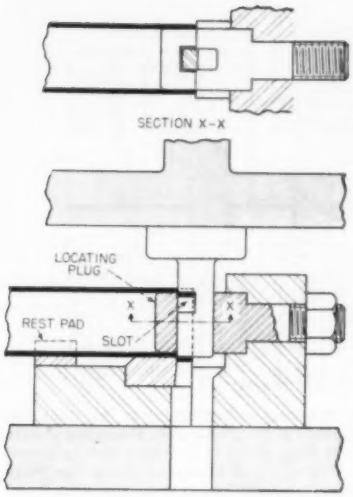
Long shells are pinch trimmed in a push-through die. The sharp cutting edge of the punch pinch trims the shell flange against the radius on the die opening and pushes it through to drop into a box. Again, the outside projection is reduced by ironing action of the die against the pilot



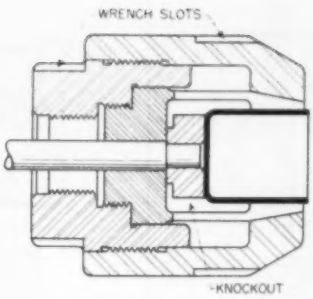
Square trimming of round shells is done in horn-type dies when production requirements are low. Descent of the punch trims a section from the periphery, while a backup block prevents punch deflection. The shell is then rotated by hand and sections cut away until the scrap edge is removed entirely



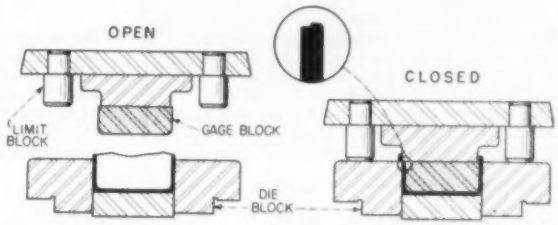
Slots and irregular notches may be cut in the edges of a shell with cam-operated dies. Side punches are withdrawn by cams when the ram is up, allowing the shell to be placed over a locating plug. Upon ram descent, a pressure pad seats the shell on the plug, and the cams advance the side punches. Scrap slugs are pushed into recesses in the locating plug, drop to the surface of the dieset, and are blown off by air



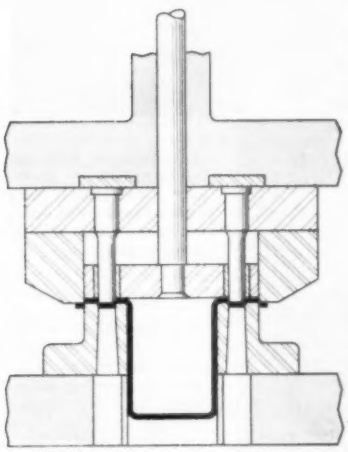
Two notches are cut in shell ends or tube ends with a horn die. The part is slipped over the locating plug, the upper edge entering a slot cut into the punch. At ram descent, both notches are cut. The lower slug drops through the die, the upper slug is raised flush with the locating plug and is blown off. The free end of the work is supported by a rest pad at suitable distance



Square edges on heavy-gage shells are best obtained with a special collet chuck used in a lathe. The shell is pushed into the collet and against a combination stop and knockout. The collet is tightened and the shell is trimmed with a single-point tool. This device can be used for small lots of thin-gage shells

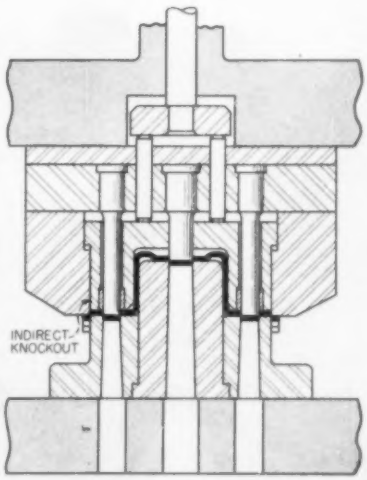


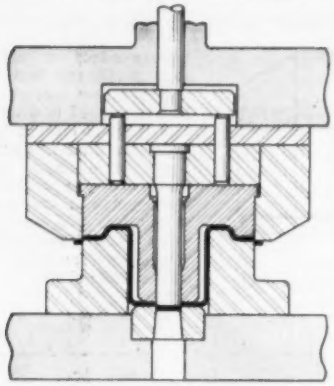
Flat-edge trimming is done in a Bliss trimming press or in a patented Brehm die (shown). The shell is placed in the die, the ram descends, and the gage block enters the shell. Limit blocks bearing upon the die block depress the lower assembly against springs. With continued descent, cams move the lower die from side to side, and then front to back, to trim the sides or notch the edges. A small inside radius is produced, and the method can be used on shells to 10-gage, (0.1345 in.)



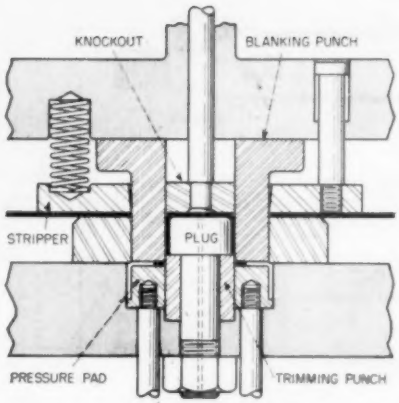
Trimming combined with blanking, piercing or forming promotes economy. Shown is a die that pierces holes in the shell flange at the same time the edge is trimmed. After trimming, the shell is carried up in the upper die and is stripped from it and the punches by a knockout

Shallow shells are trimmed and pierced in an inverted die, wherein an indirect knockout must be used because of the centrally located punch. Bushings in the knockout support the long slender punches that pierce the flange holes. The central punch which pierces the bottom does not need support





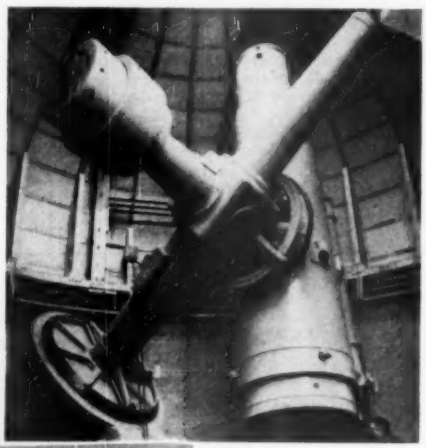
Forming of a shell flange can be done on thin stock, while the trimming operation is in progress. In the tool shown, a central hole is also pierced in the shell bottom. The trimmed edge is cut at a slight angle, because the stock is being pulled while the trimming punch is going through it



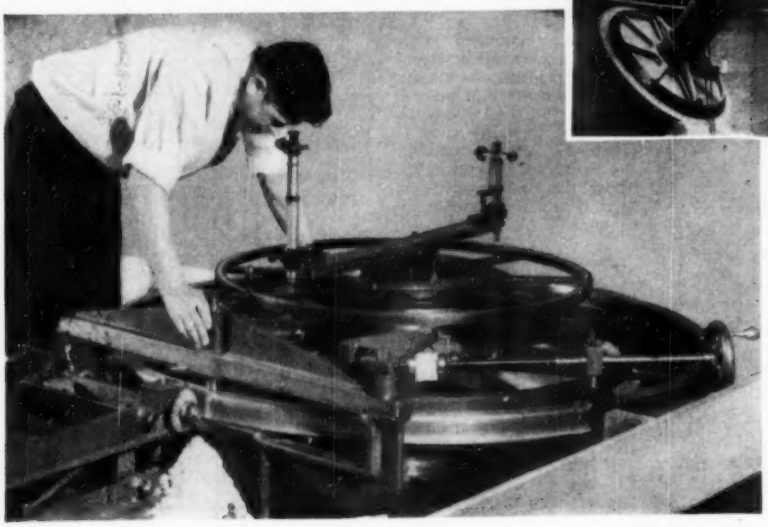
Blanking from strip, drawing and trimming in the same die are practical and provide high production. Blanking punch draws the shell over a plug, and a trimming punch in lower member pinch trims the part. A knockout ejects the shell at top stroke, and a spring stripper removes the strip from the blanking punch. The pressure pad supplies pressure for drawing and strips scrap ring from trimming punch

How To Split A Hair . . . 12 Ways

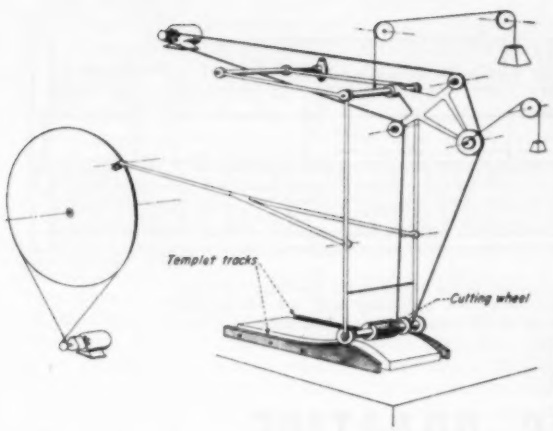
TO CUT the right ascension worm for a new University-of-Michigan 24-in. telescope, Warner & Swasey hauled out a 40-in. automatic dividing engine built by Ambrose Swasey 50 years ago. The machine is still the most accurate of its kind. It cuts a finely divided circle accurate to one second of arc—a maximum error of a third of an inch subtended at a distance of one mile. The circle's graduation lines are barely visible, but they are 12 times as wide as the maximum error of the machine.



Schmidt-type telescope at University of Michigan must follow stars against rotation of earth so photo-plate can be time-exposed



Gear gasher for ascension worm was clamped for each cut after location of dividing circle through microscope. Special machine has only one cutter



Two motors run the rig. One operates the cylindrical grinding wheel through a pulley system, and the other oscillates the support arms, making the wheel reciprocate

Polishing is done with emery paper held around the wheel by a dog. Templet tracks, bolted to each side of the work, guide the grinder to the exact form

HOMEMADE GADGET GRINDS IN TWO DIMENSIONS

BY HOWARD E. JACKSON

RUBE GOLDBERG contraptions are usually a dime a dozen; but a home-grown, garden-variety gadget that really does a job is something else again. This one, built especially to finish wind-tunnel sides to an accuracy of ±0.0005 in., can handle a number of two-dimensional profiling jobs.

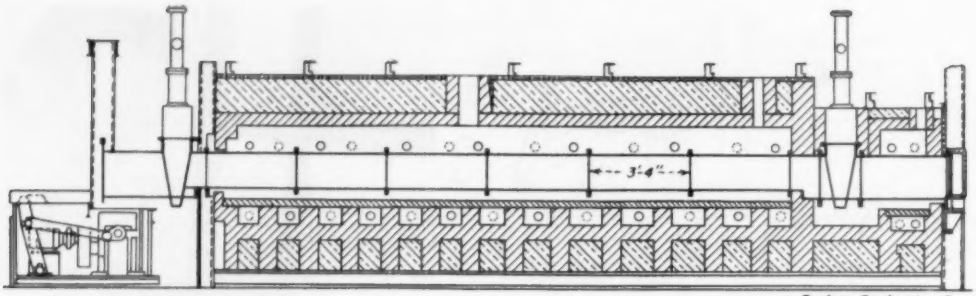
Two wind tunnels at the University of Washington, designed by G. E. Ledbetter, work up airspeeds as high as 1300 mph. The throat section of each tunnel has removable curved walls that must be both accurate and smooth to keep the airstream flowing right. For this purpose, George E. Maxey designed and built an odd-looking but perfectly effective grinder that moves a rotating emery disk over the walls before they are assembled.

Power is from one ¼-hp motor that drives the grinding arbor through a belt like those on dentists' drills, and another ¼-hp motor oscillates the arbor through a gear reduction taken from an old coal stoker. Weights hanging on pulleys keep the belts under tension and maintain a downward pressure on the cutting wheel.

Precision depends primarily upon the two templets that are slipped in place beside the work. These are made from sheet metal by hand. Good accuracy can be maintained without grinding. Rollers on the grinding arbor rest on the templets; and because they are the same diameter as the grinding disk, the templet-follower ratio is 1 to 1.

Work as wide as 7½ in. and as long as 36 in. has been finish-ground under the arbor, which is 10 in. long. The grinding disk is 1 in. wide, so it must be moved across the work at frequent intervals. For the wind tunnels, throat sections were ground to provide openings as large as 3 by 3 in. (for testing small models) and as small as 1 by 2 in. (for flow-tube research).

Finished throat sections are installed in one of two wind tunnels, where the polished surfaces offer little wind resistance



Surface Combustion Corp.

Muffle-type gas carburizing furnaces were originally designed for continuous straight-through operation. Long muffles are expensive originally and for replacement. Good muffle life ranges from 20,000 to 40,000 heat hours of operation at 1700 F

GOOD CARBURIZING PRACTICE

II..Application of Pack and Gas Carburizing

There are practical reasons why both pack carburizing and gas carburizing continue in broad use...By knowing the relative advantages and disadvantages of these processes and the kinds of furnaces required, it is possible to make a good choice for your own situation

BY T. A. FRISCHMAN, Chief Metallurgist
AXLE DIVISION, EATON MFG. CO.

PACK carburizing, despite certain disadvantages, has enough good points to deter one from forsaking it when revamping the layout of heat-treating departments in favor of the more modern gas and salt-bath methods. Let us consider the advantages and then the disadvantages of the pack method:

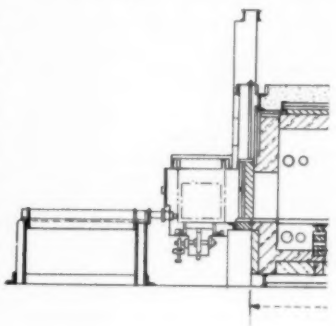
Advantages

Various sizes and contours of parts to be carburized are no problem as long as they will fit into the containers. There are no fixtures, separators or support problems, because the compound itself acts as the supporting medium. Wide varieties of sizes and shapes can, therefore, be accommodated without additional equipment.

The method is especially well adapted to direct quenching from the carburizer, especially where quenching dies are used. Here, the parts can be held unexposed to air, with not too large a temperature drop, while each piece is individually die quenched or handled otherwise. The method likewise can be used in conjunction with time quenching, martempering or selective hardening, in that the remaining pieces can be kept above the hardening temperature until the contents of the box or container are entirely removed.

Another advantage frequently overlooked is that, in case of power failures or gas shut-offs, the parts in the containers can be cooled down to room temperature, if necessary, without scaling. This is not always true with gas carburizing in the cited emergencies.

With pack carburizing, purging or seasoning the furnace is eliminated. In contrast with other methods, the operation can be started either with the furnace at heat or the work and container can be brought up to temperature with the furnace. There is no explosion or splash hazard such as from the gas and salt-bath methods, respectively. Downtime for carbon burnouts and cleanings is not a factor, and the problem of carbon stop-off is not as acute as with gas carburizing, where carbon penetration



of coatings is difficult to prevent.

Shop control of pack carburizing is simple. If proper additions of new compound are conscientiously made and the fines are effectively screened out, little control beyond these measures is necessary, assuming proper temperature control. No gas analyses nor cyanide titrations are necessary as for the gas or salt-bath methods.

Another advantage of pack carburizing is that parts can be machined after slow cooling, wherein they become relatively soft. Following machining, the parts can be hardened. Furnace construction is far simpler and less costly when designed for pack carburizing than for the gas method. While these are important factors, the furnace can be more easily used for other heat-treating operations such as normalizing, annealing, hardening and tempering.

Disadvantages

Dirt, dust and heat cause poor shop conditions unless effective exhaust systems and automatic handling, screening, mixing and storing of the compound are provided. Much space is required for storage of new compound, containers and covers, and also for cooling the working mixture. Space is also required for storage of the working mixture, containers and covers, especially when large continuous furnaces are emptied or shut down.

Frequent handlings of compound throughout the process add to expense from the time shipments are received through the operations of storing, making additions, plus packing, emptying and refilling containers.

A disagreeable and dirty job is the cleaning of dust collectors and disposal of excluded fines. Containers and covers are costly. Both are usually made from high-percentage, nickel-chromium alloy.

Use of pack carburizing is generally restricted to case depths greater than 0.025 in., because it is difficult to heat uniformly and quickly through carburizing compound. Such material has relatively poor heat conductivity. Case depth is usually prescribed to wider ranges than the other methods of carburizing, especially when batch type furnaces are used. This is true because heat input lags into containers at the center of the furnace charge. At this location, radiation from the hot furnace walls is materially reduced by surrounding or enveloping containers.

Experience has shown that difference in carbon content of work in containers adjacent to the furnace wall and at center of the charge amounts to 0.10% carbon content in the outermost layer of the case and 0.13% carbon at a depth of 0.050 in.

Continuous or straight-through furnaces, because of their more uniform heating characteristics, are effective in eliminating such discrepancies in pack carburizing. Elapsed time to complete the carburizing operation for a given case depth is longer for the pack method than for other methods, but once the carburizing temperature is attained the rate of carbon penetration is virtually the same.

Control of Compound

As a rule, larger shops test incoming shipments of carburizing compound for weight per cubic foot, the particle size with standard sieves, the chemical analysis, the shrinkage loss upon exposure to standard heating conditions, and the carburizing activity by one of several methods. These are: (1) increase in weight of a specimen due to carbon absorption, (2) microscopical examination of type of case produced and carbide distribution, (3) fracture and etch method for case-depth determination, and (4) carbon concentration throughout the case depth, as determined by carbon determinations on successive depths of turnings taken from a test sample. A checking procedure such as mentioned is a safeguard against manufacturing variables in the compound, and is good insurance that nothing will miscarry in large-scale operations.

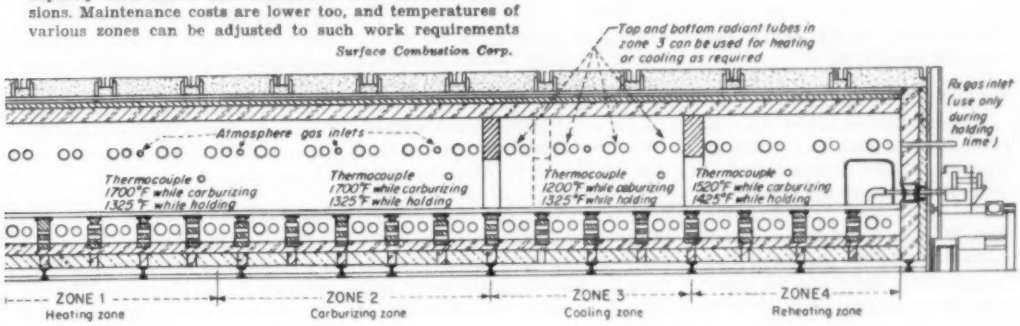
Pack-Carburizing Furnaces

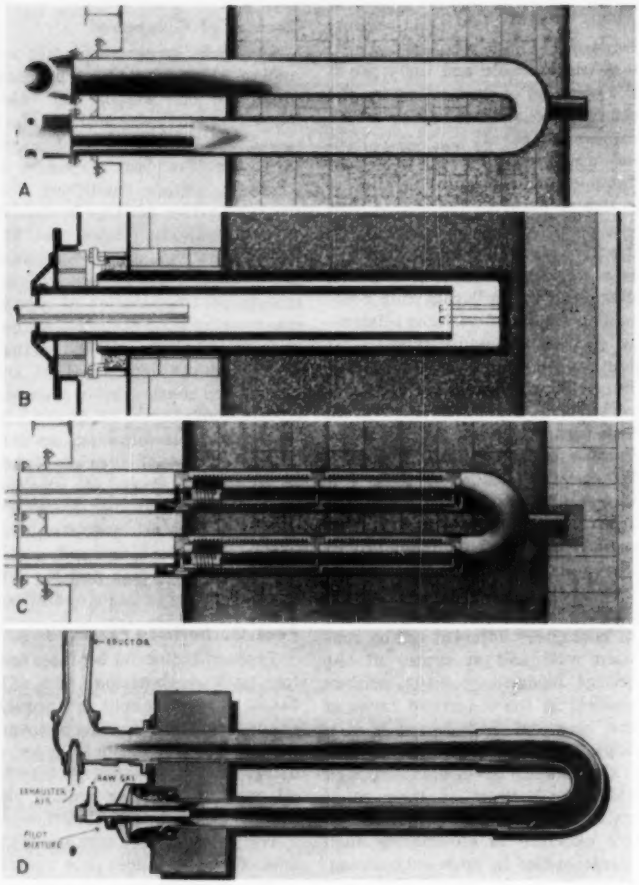
Types of industrial furnaces used for pack carburizing are: (1) batch, (2) continuous or through, (3) rotary, (4) pit, and (5) rotary retort. All conventional types of firing, such as gas, electricity or oil, may be used for heating, depending upon locality and furnace.

The rotary-retort furnace is the only type that does not require containers when used for pack carburizing. The work tumbles around with the compound, and both are in constant contact throughout the cycle. This method is one of the oldest. In some instances none of the newer methods of carburizing

Continuous furnaces of the radiant-tube type have greater capacity than muffle furnaces of the same over-all dimensions. Maintenance costs are lower too, and temperatures of various zones can be adjusted to such work requirements

Surface Combustion Corp.


Top and bottom radiant tubes in zone 3 can be used for heating or cooling as required
Rx gas inlet (use only during holding time)
Atmosphere gas inlets
Thermocouple 1700°F while carburizing 1325°F while holding
Thermocouple 1700°F while carburizing 1325°F while holding
Thermocouple 1200°F while caburizing 1325°F while holding
Thermocouple 1520°F while carburizing 1425°F while holding
ZONE 1 Heating zone
ZONE 2 Carburizing zone
ZONE 3 Cooling zone
ZONE 4 Reheating zone



Radiant tubes for heating carburizing furnaces operate on the positive-pressure principle, *A*, *B*, *C* (Holcroft & Co.) and the negative-pressure principle, *D* (Surface Combustion Corp.) *A*—In cast-alloy U-design, fuel gas or oil is burned to radiate heat to furnace chamber. *B*—Refractory tube assembly burns gas or oil, is adapted to use in batch furnaces, where high heat input in limited space is required. *C*—Electrical resistors are used where power rates are low or gas is unavailable, but tubes can be used for gas or oil by removing resistors. *D*—Slight negative pressure within the radiant tube is created by an eductor, and burnt gases cannot leak into furnace chamber to disturb carburizing-gas reactions

has been able to supplant it from the cost standpoint.

Gas Carburizing

Gas carburizing involves the use of fuel gases such as natural gas, propane, butane, manufactured gas and other compositions as the carburizing medium. Hydrocarbon liquids such as pine oil, benzol, dipentine or other proprietary oils, which break down into oil vapors, are also employed. Workpieces are exposed to these gases in retorts, muffles or tight furnace chambers under slight pressure, and maintained at the same temperature ranges as used for the pack method.

Factors accelerating the adoption of gas carburizing are: (1) rapid application of the principles of gas chemistry, (2) improvement in gas generators, (3) furnace design, especially of the continuous type, (4) adaptability to large-volume production, (5) facility for automatic direct quenching, (6) control of carbon concentration of the case, and (7) cleaner shop conditions.

First applications of gas carburizing, where the method became most successful, employed natural gas for the carburizing medium, either in rotary or pit-type furnaces. In localities where the constancy of fuel-gas composition could not be relied upon, the pit-type furnace using oil vapors became very popular. Even today this is standard gas carburizing equipment in many plants. In the early '30s the continuous type furnace was successfully adapted to the process. At this time also, the horizontal, batch-type, gas-carburizing furnace was introduced, but never became so extensively used.

Present-day continuous gas carburizers make considerable use of the automatic direct-quench principle whenever possible. Subsequent automatic washing and tempering operations are incorporated in many installations, thereby reducing labor costs.

As the operation stands today, the types of furnace equipment in general use are: (1) continuous, (2) stationary batch, and (3) retort, vertical pit or horizontal rotary. The earlier continuous type had a long, heat-resisting-alloy muffle with inner sealing doors and outer doors on each end of the furnace. Except for a few instances, the furnaces were gas fired. As the radiant tube type of heating with gas was developed, the muffle-type furnace gave way to the steel shell lined with brick resistant to the carburizing action, and welded tight to contain the gaseous atmosphere under slight pressure.

Another advantage of the radiant-tube continuous furnace over the muffle type is that multiple lines producing different case depth ranges are more easily attained. The comments between the earlier horizontal-batch type and later designs parallel those given for the continuous types.

Radiant Tube Heating

Since carburizing-gas reactions are dependent upon definite percentages of various constituents, the products of combustion arising

from firing of fuels must not be permitted to contaminate the desired gas reactions for carburizing. For this reason, the heating or burning of the gases is confined within tubes. These in turn radiate heat to the furnace interior.

Radiant tubes are of straight-through or the preferable U design. One end admits the combustible gas mixture and the other discharges burnt gases or products of combustion. Since the tubes must withstand high temperatures, inside and out, the deleterious effect of the carburizing gases, and occasional long spans, they are made from cast heat-resisting alloy, formed heat-resistant sheet alloy, and for special applications in refractory materials.

Today, there are available for commercial use several different makes of radiant heating tubes incorporating different design features. With the exception of one type, those using gas or oil for the firing fuels operate at a positive pressure to that of the gaseous atmosphere in the furnace chamber. Predetermined amounts of air and fuel are admitted into the firing leg, thus burn to complete combustion along the length of tube within the furnace chamber. Proper burning characteristics of the air-gas mixture can be obtained by analysis of the burned gases emitted from the discharge leg.

In the type of radiant tube operating at slight negative pressure, air from a blower is passed through an eductor at the end of the discharge leg, thereby causing suction which in turn pulls the long luminous flame and combusted gases through the heating tube. The burner is attached to the outer end of the firing leg. Raw gas or oil is admitted under pressure into the tube, and the air needed for combustion is pulled in around the burner into the tube.

This type of tube has the advantage, due to its operation under negative pressure, of preventing the contamination of the gaseous atmosphere in the furnace chamber in the event of metal failure of the radiant tube. If leaks develop, the atmosphere is sucked from within the furnace. Thus, the leak becomes readily apparent due to the appearance of flame in the eductor end of the tube. So long as suction is maintained on the discharge end of the tube, products of combustion from within the tube cannot enter the furnace chamber. The main advantage, however, is not so much the immediate discovery of leaks, but the fact that there is no chance for contamination of the furnace atmosphere.

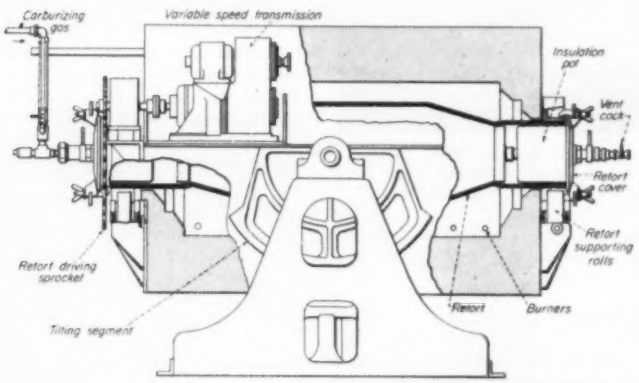
Other Gas-Carburizing Furnaces

The horizontal, rotary-type gas carburizing furnace is used extensively in small and large plants, because of versatility. Where some nicking or rubbing together of workpieces can be tolerated and where final grinding follows, the furnace does a commendable job. This design lends itself exceptionally well to the process of diffusion, where carburizing gases such as natural gas, propane or butane, which are high in hydrocarbons and cause sooting, can be employed without ending up with high-carbon concentration cases. The furnace likewise is especially adapted to carburizing small parts that are direct quenched from the carburizing temperature, the constant rotating action preventing soot deposits from coating the work. Generally, this type of furnace is externally gas or oil fired and the retort is operated under a slight positive pressure. Circulation of the carburizing gases is derived from the incoming gas pressure. For this reason, natural gas is the most convenient and desirable fuel.

The vertical pit-type furnace, with or without forced gas circulation, has applications where other types are not so well suited. This type furnace is frequently used where wide varieties of both large and small parts are to be carburized, and where different case depth ranges are specified. It serves other purposes as well, especially in smaller heat treat shops, in that the furnaces can be used for normalizing, annealing, hardening and tempering operations, particularly where circulating fans are part of the equipment.

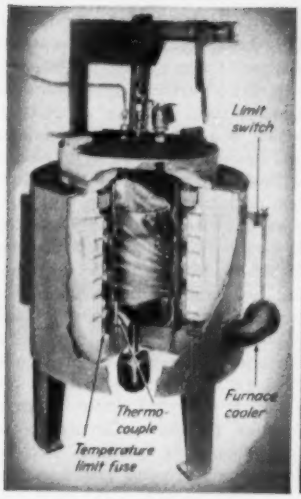
Early-type pit furnaces did not employ circulating fans for the carburizing gases, and for the most part the retorts were externally gas fired. Today, both gas and electricity are used as the means of heating. Recently, radiant tube heating has been successfully applied to this type of furnace. The fans for gas circulation in pit furnaces may be placed either above or below the retort, depending upon the design. Fan location makes little difference from a case-depth viewpoint, but certain maintenance advantages are claimed for either fan position. In large continuous gas carburizing furnaces, fan circulation is rarely employed.

As a rule, small densely loaded parts are not put through the large continuous, radiant-tube furnaces, but rather through the fan-circu-

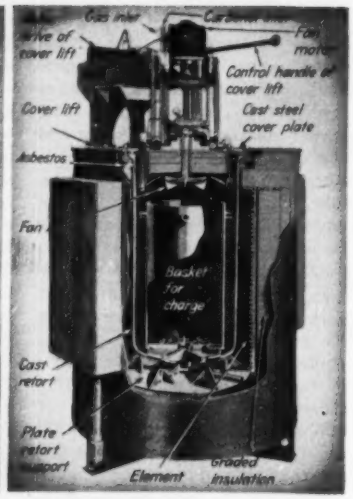


American Gas Furnace Co.

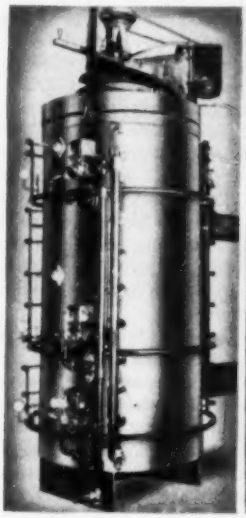
Horizontal, rotary-type gas carburizing furnaces slowly tumble small parts in a retort fired with gas or oil. To dump the work into the quench, the furnace is tilted



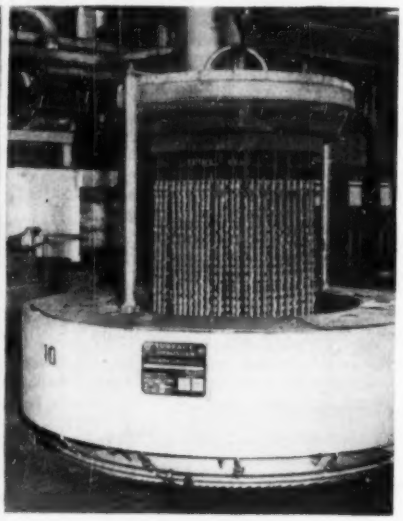
A—Electrically heated furnace, Leeds & Northrup.



B—Electrically heated furnace, fan above retort, made by Hevi Duty Electric Co.



C—Tangential gas burners heat pit-furnace produced by American Gas Furnace Co.



D—Radiant heating tubes are used in large pit furnace designed by Surface Combustion Corp.

Pit-type furnaces are used for carburizing large and small parts in a wide variety, and also handle other heat treating operations. Fan circulation is common; gas and electric heating are used

lated pit type, the horizontal rotary, the salt bath and the shaker hearth type. Atmosphere circulation promotes uniformity of case depth throughout the charge, especially under dense loading conditions, and also aids in heating the parts more uniformly and rapidly to the desired carburizing temperature.

Where pit-type furnaces are of necessity made deeper than customarily used, intensive purging with the carburizing medium should be employed at starting.

HOW TO CALCULATE DRAWING PRESSURES

BY FEDERICO STRASSER

MANY handbooks give data to calculate pressures required by cutting dies, but seldom for drawing dies. Therefore, fellow-toolmakers may appreciate the European method given here.

The formula for drawing pressure is:

$$P = 4\,d\,s\,k\,m$$

where P = drawing pressure, lb.
d = drawing punch diameter, in.
s = stock thickness, in.
k = ultimate shearing strength of the stock, lb. per sq. in.
m = drawing coefficient

Values for k are:

Nickel	60,000 - 75,000
Hard steel	45,000 - 60,000
Mild steel	40,000 - 50,000
Brass	35,000 - 40,000
Copper	28,000 - 30,000
Zinc	18,000 - 20,000
Aluminium	15,000 - 19,000
Tin	5,000
Lead	4,000

Drawing coefficient m depends upon the ratio between the drawing punch diameter d and the original blank diameter D, both magnitudes expressed in inches:

d/D	m	d/D	m
0.55	1	0.70	0.60
0.575	0.92	0.725	0.55
0.60	0.86	0.75	0.50
0.620	0.80	0.775	0.45
0.65	0.72	0.80	0.40
0.675	0.66		

Pressures calculated by the above method give approximate values, because the method is suitable for selection of the press.

The great majority of drawn parts are cylindrical, conical, etc. In the case of elliptical, rectanguar and irregular shells, the calculation is analogous; with the difference that d and D represent corresponding diameters of circles, with areas equivalent to the drawing punch section to the surface of the blank to be drawn.

The formula for approximate holding pressure in drawing dies is

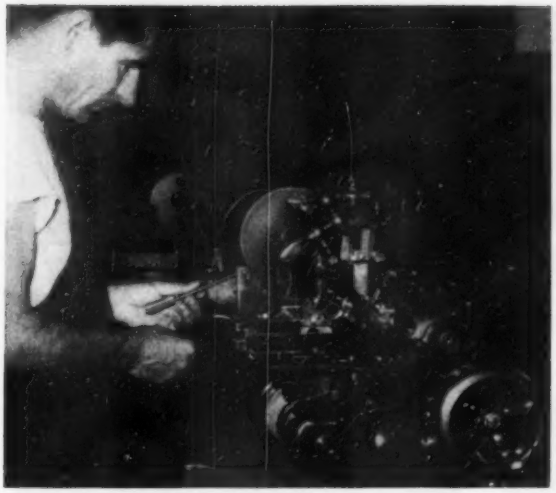
$$P = 115\,(D^2 - d^2)$$

In case of thin stock the constant must be increased up to 230.

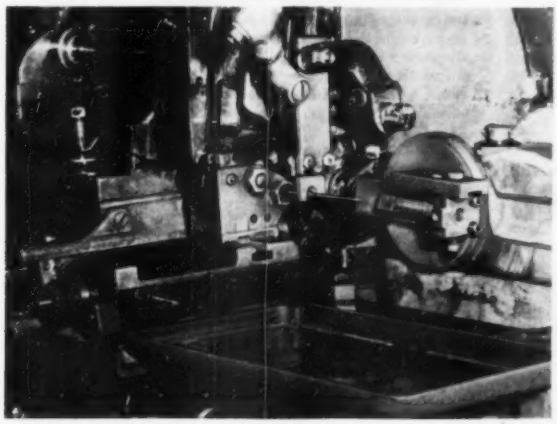
AIR FEED EQUIPS SCREW MACHINE FOR LONG BARS

The trick in long-bar jobs is to keep downtime short. Clary Multiplier boosted output 75% with a special indexing air-powered stock feed

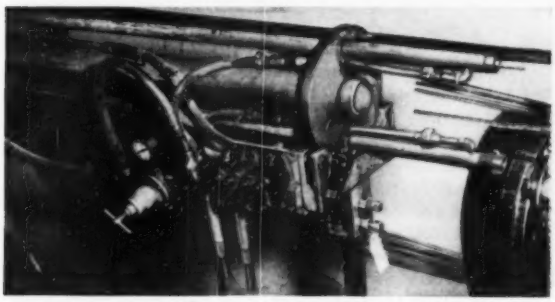
BY JOHN STARR



Long bars (up to 14 in. long) are cut in large sizes (up to ½-in. dia) on a standard screw machine with air feed. The mechanism practically eliminates time lost in reloading the spindle



Tooling for turning and grooving is on front and rear cross-slides; cutoff is done with vertical tool. Swing stock carries support that guides the long rods



Feed device has two tubes which index into position behind spindle. Air through 4-way valve goes to front and rear of each tube to advance or retract stock-feeding plungers

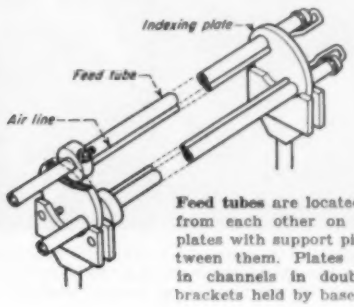
ADDING machines and cash registers need grooved shafts in ½-in. diameters and lengths up to 14 in. Such work is not normally an economical job on screw machines, which are best fitted for short shafts; but after the screw machine was revamped for air feed, the cycle of cutting operations was almost continuous.

Stock fed through the spindle from one of the feed tubes is advanced by a plunger working under 5 psi from the 4-way air valve. A stop on tht turret locates the work, and the automatic machine cycle starts. Cutting is done with circular form tools on both slides.

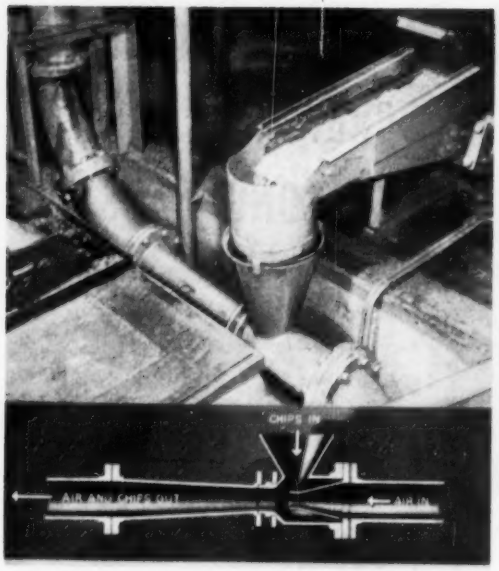
After cutoff, the work drops and new stock is advanced by means of the plunger. Control is now by hand, but is adaptable to operation from the camshaft of the screw machine.

While one bar of stock is working, the other feed tube is exposed so stock can be loaded over the lathe. The plunger is withdrawn, and stock is inserted and lined up with the front end of the tube. Once the end of the working bar has passed from the lower feed tube, the machine takes over feeding operations. Then the fixture is indexed around 180° and the next length of stock is in position to be fed instantly into the machine.

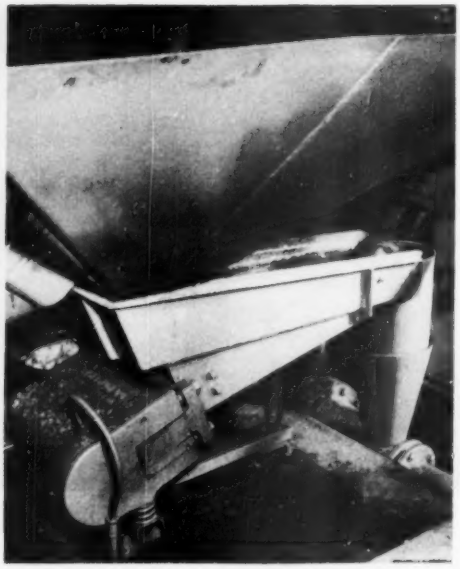
Tolerances in the adding-machine shafts are ±0.001 for diameters and 0.002 for lengths between grooves.



Feed tubes are located 180° from each other on round plates with support pipe between them. Plates rotate in channels in double-end brackets held by bases



Venturi-tube blast nozzles provide power for moving chips quickly and economically in chip room at Bellwood plant of Chicago Screw Co. Chip movement includes 72-ft lift and 86-ft carry from lower level of crusher pit to upper track hoppers. Large-radius bends in delivery pipes minimize wear from abrasion of fast-moving chips



Vibrators on hopper wall and feed chute deliver chips to venturi-tube nozzle in steady stream. This hopper for aluminum chips is similar to hoppers for brass and steel chips. In one hour, hopper will handle three tons of steel chips, two tons of brass chips, or one ton of aluminum chips. At this stage, chips have been centrifuged

VENTURI BLOWERS HANDLE CRUSHED

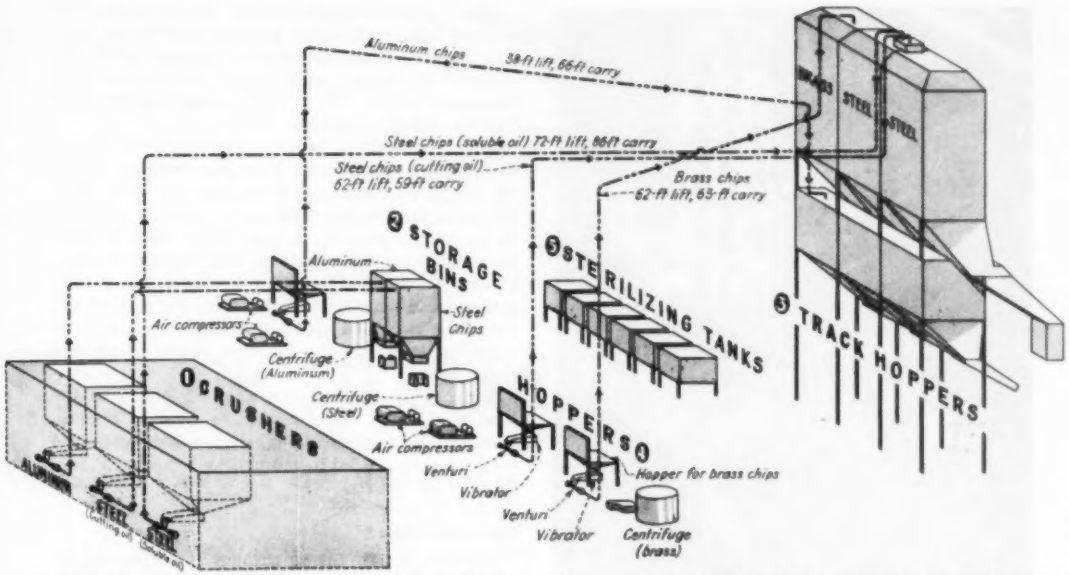
Chip deck is located above crushers (1). Steel and aluminum chips are brought in and dumped by fork truck, then are raked into crusher. Brass chips are not crushed

Pneumatic system keeps three materials segregated in new chip-disposal installation. Crushed and dry chips bring higher prices . . . savings also come from reclaimed cutting oil

BY F. W. CREAGER, Chief Plant Engineer
THE CHICAGO SCREW COMPANY

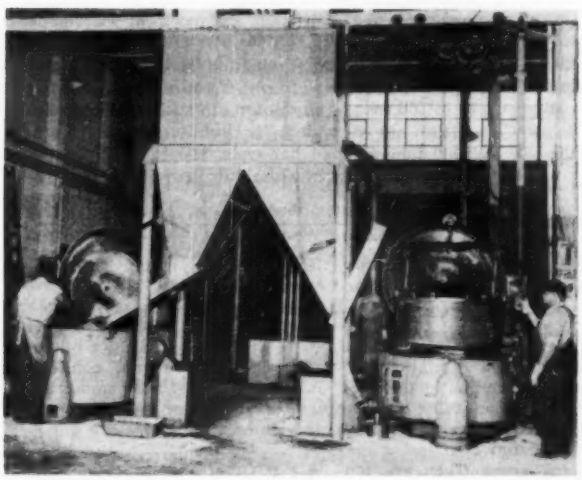
CHIP-HANDLING at the new Bellwood Plant of Chicago Screw Co. is a relatively large-volume operation, yet the penumatic system designed and installed by Turbine Equipment Co. of New York requires only four men per shift for its operation. One principal reason for the high efficiency of this installation is the application of venturi-tube air-blast nozzles for handling all chips after crushing and centrifuging.

Initial step in the process is crushing. Crushing results in easier handling, makes possible increased recovery of cutting oil, and obtains the price advantage of crushed dry chips over those offered for sale uncrushed and oily. Steel and aluminum turnings are crushed in three heavy-duty crushers lo-



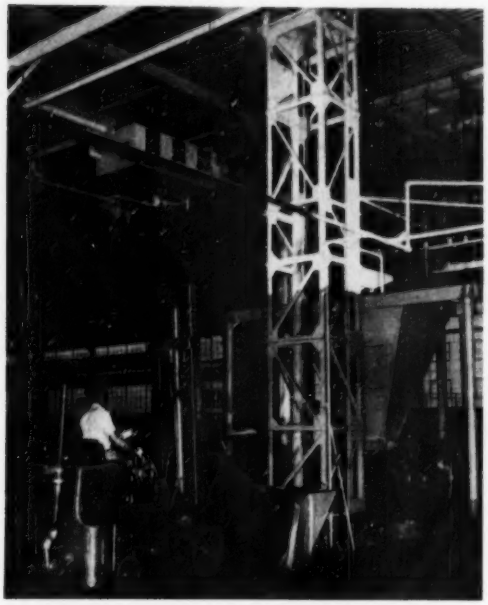
Chip-handling system processes approximately 7500 tons of chips per year. Chips to be crushed are dumped on chip deck (1). Those with cutting oil are fed by venturi-action to bins (2), are centrifuged, moved to hoppers and venturis, and again are conveyed pneumatically to track hoppers (3) for loading in RR cars. Chips with soluble oil go directly to track hoppers. Brass chips (4) are not crushed, but are centrifuged and are moved to hoppers (3). Cutting oil, recovered by centrifuging, is sterilized (5), purified, and returned to underground storage tanks

CHIPS RAPIDLY



Centrifuges for aluminum and steel chips flank storage bins (2) so chips can be chuted directly to tubs. After centrifuging, tubs are lifted with overhead hoists for dumping into hoppers that feed chips to venturi-tube nozzles. Chips then move to track hoppers. Separate centrifuges are provided for aluminum, steel, and brass chips

Outdoor hoppers (3) for storing chips and bar ends were designed by Gifford-Wood especially for this installation. Three upper-level hoppers each have 2,000-cu ft capacity, hoppers on lower level have 750-cu ft capacity each



Skip hoist receives brass chips from shop carts moved by fork-lift trucks. Hoist moves chips to storage bin over roller conveyor. From bin, chips are loaded into centrifuge tubs on conveyor. After moving to centrifuge, tubs are lifted into unit by overhead hoist

cated in a pit along one side of the chip-handling area. Brass chips, however, are not crushed, as these alloys break into small chips during machining.

Following crushing, turnings produced with soluble oil are moved directly to an outside storage hopper. No attempt is made to recover soluble oil. Chips that are coated with cutting oils, however, are centrifuged. Separate centrifuges are employed for aluminum, brass, and steel chips. Storage bins for oily chips are provided beside each centrifuge. Below each crusher and at each centrifuge is a venturi-blast nozzle.

Four positive-displacement Root-Connersville blowers supply air under pressure for the six venturi nozzles. Three blowers are rated at 1,000 cfm at 5 psi; the fourth, for blowing crushed and dried aluminum chips to the outside storage hopper, is of slightly smaller capacity.

Supply lines from blowers to venturi nozzles are 6-in. pipe, while delivery lines from venturi nozzles to storage bins and outside hoppers are 5-in. pipe. All turns in delivery lines are of one or two 45°, 24-in. radius elbows, to provide a more gradual curve than would be possible with standard radius 45° or 90° elbows. As chips in the delivery lines achieve a velocity up to 5,000 fpm, the cast elbows are specially chilled to 600 Bhn, and have 1-in. thick walls to withstand the abrasive action of passing chips.

Chips from the crushers drop directly into the feed hoppers of their respective venturi nozzles. However, after centrifuging, chips are dumped into hoppers, then are fed to venturis by Syntron "Vibro-Flow" feed chutes.

Oil Is Reclaimed

Oil drained from the centrifuges is pumped to 650-gal. sterilizing tanks. Three tanks handle oil recovered from steel chips, one handles oil from aluminum chips, and two are for oil from brass chips. Cutting oil treated in these tanks is transferred by pump to a DeLaval centrifugal oil purifier capable of handling 5 gpm.

Cleaned and sterilized oil goes to underground storage tanks, then is pumped into shop supply lines as needed. A hydro-pneumatic pumping system insures constant oil-delivery pressures. After passing through the centrifugal oil purifier, oil from aluminum chips is passed through a Fram oil filter to remove the fine chips that are too light for removal by centrifuging.

Average annual production of chips is approximately 6,300 tons of steel, 1,100 tons of brass, and 80 to 100 tons of aluminum. In addition, storage facilities are provided for handling approximately 2,000 tons of steel bar ends, 100 tons of brass bar ends, and 8 tons of aluminum bar ends annually.

Tips FOR TOP SHOP MEN

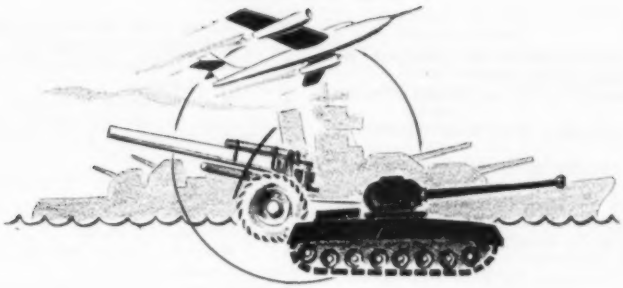
361 Every "new" shop idea always brings a chorus of "we did that in 1910" from somebody who should have remembered it—and didn't. If it works, it is deserving of commendation, whether or not somebody has done it before—or thinks he has. The valuable man is the one who figures out what to do at the time it needs to be done.

362 It isn't what ability you *have* that your employer pays for—it's the ability you *use*.

363 If you call a conference on a problem, don't stymie it by presenting your solution at the outset. State the problem fully, clearly, and without bias. Ask for suggestions and don't interrupt or object while they're being given. Then ask for discussion. Only then make your decision—and if you can't decide, ask for further study and set another definite meeting date. Meanwhile, don't fret or worry over the problem: you'll only make it harder to solve.

364 Research is of two kinds, research to find the truth, and research to prove your point. The latter makes good sales ammunition, but is of no use in improving a process or a product.

365 Other things being equal, people do what's easiest. If you want certain rules followed, make them easier to follow than to violate. That may take ingenuity, but that's what a boss is for.



HOW TO MAKE ARMAMENT

A RESERVOIR OF METALWORKING KNOW-HOW SINCE 1938

METALWORKING knew, in 1938, how to make automobiles, appliances, and a thousand and one other peacetime items. But it didn't know how to make modern munitions—had had no chance to learn.

But we promptly applied mass-production know-how to armament manufacture, first for the British and French, then for ourselves. We poured forth a prodigious array of war goods in a production performance that was the wonder of the world.

Now we are on the threshhold of another armament-production job, which may prove to be only a prelude to another war. We must make weapons in quantity again. The time interval since 1945 is short enough so much of the know-how is still available, but workers have moved, weapons have improved (and become more complex), time available in which to "get set" has been slashed.

To save your time in planning and preparation, we present here a bibliography of AMERICAN MACHINIST articles since 1938 concerned specifically or basically with Armament production. Even in 1938 we were describing plane, propeller, and similar production later directly applicable to war work. We also described arsenal and navy yard methods (1939), techniques of first industrial munitions contractors, and beginning in 1940, an Armament Section in every issue straight through World War II. With the return of a troubled peace in 1945, our readers were sick of any article even remotely suggesting armament, but we did continue to provide information on machining the many new materials and components that war-developed designs brought.

All these are here indexed in a compact list, subdivided by process into major categories such as "Assembly" or "Processes." These in turn are subdivided into groups such as "Welding" or "Press-work." To simplify use of the list by men interested in a specific type of armament, each listing bears at the left one or more of four initials, "A" for aircraft, "V" for vehicles, "S" for ships, and "O" for ordnance or weapons. Articles on materials or forging, for example, carry all four initials, because they apply equally to all. Articles describing a number of processes are listed under "Processes—General"—as for example "The Manufacture of H. E. Shell."

Reprints or tearsheets of these articles are not available in most cases. Those we have are so indicated by a single-copy price at the end of the listing. If you wish reproductions of other articles, and have no file of your own and none in a local library, we can provide photostats at 40 cents a page. Each listing includes the number of pages (to nearest page).

This bibliography provides a basis for future Armament Reports in AMERICAN MACHINIST, the first of which immediately follows this list. It deals with transformation of the Pershing Tank into the General Patton at Detroit Arsenal operated by the Ordnance Corps of the Army. Other Armament Reports, similarly designed to keep you abreast of latest developments in methods, will appear in subsequent issues—normally at least one per issue. All will carry the emblem which is shown above.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

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ASVO Can it be Broached? 3/9/38, 3p. Examples of broaching, including turbine blades

- - - O Rifle Parts—Broached 11/1/39, 4p. Details of operations

- - - O Broaching Hits the Mark 11/29/39, 4p. Operations on rifle parts

- - - O Inside and Out 12/13/39, 4p. Broaching operations on rifle parts

- S - - Broached Blades for Navy Turbines 8/5/43, 16p. Details of production operations

- - - O Rifling Gun Barrels by Broaching 10/14/43, 8p. Detailed production operations

ASVO Simplified Tools Designed for Broaching Splined Forms 10/25/45, 4p

ASVO A Handbook of Vertical Surface Broaching Fixtures 1/1/48, 16p; 1/15/48, 16p

ASVO A Handbook of Horizontal Broaching Fixtures 12/16/48, 16 p 25¢

A - - - Unmachinable Turbo-Jet Parts Broached 2/24/49, 4p

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- - - O Guns Cast Centrifugally 8/6/42, 2 p. Centrifugal casting methods

ASVO War Producer Selects Lost-Wax Casting Process for Complicated Parts 3/2/44, 3p.

ASVO Lost-Wax Process Precision Casts Super Alloys 4/11/46, 4 p

ASVO How to Make Precision Castings 6/19/47, 16p 25¢

ASVO How to Make Die Castings 12/18/47, 16p 25¢

ASVO Foundry Methods Improve Investment Casting 6/3/48, 4p

ASVO Centrifugal Process Improves Investment Castings 8/26/48, 4p

ASVO Investment Casting on a Shoe String 3/24/49, 2p. How to make and use essential equipment

ASVO Precision Cast Milling Cutters Could Solve a Crisis 7/14/49, 5p

ASVO Investment Castings Depend on Good Pattern Tooling 7/10/50, 12 p 20¢

HOT AND COLD FORGING

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- - - O 3.7-in. Shell Forgings 12/25/40, 7p. Details of Canadian practice

- - - O Shell Forging by the Upset Method 10/1/41, 60 p. Detailed operations for production

- - - O Forging 155-mm Shell Bodies 10/29/41, 10 p. Details of production methods

- - - O Big Forging for Tank Gun 12/24/41, 1p

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- - - O Notes on Shell Forging 11/26/42, 4 p

- - - O Forging 75- and 90-mm Shell Bodies 1/7/43, 14p

A - - - Buick Forges Aircraft Engine Parts 7/22/43, 3 p

- - - O Forged A.P. Shot Saves Steel 12/9/43, 4p. Production operations on shells

A - - - Aircraft Control Joints Reinforced by Swaging 10/12/44, 1p

ASVO Fundamentals of Forging 4/10/47, 16 p 10¢

ASVO Forging Practice 5/8/47, 16 p 10¢

ASVO Fundamentals of Cold Heading 4/8/48, 12p

ASVO How and When to Swage 4/22/48, 8p

ASVO How to Make Extrusions 5/15/50, 8p 15¢

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- - - O Work at Watertown 6/1/38 4p. Operations at Watertown Arsenal

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- - - O The Story of a Shell 11/15/39, 7p. Principal production operations

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- - - O Every Shell Needs a Case 3/6/40, 4p. Production of shell cases at Frankford arsenal

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- - - O Canada Arms Britain 5/15/40, 15p. Production methods on Bren guns and 40-mm shells

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- - - O Industry Gets Educated 6/12/40, 4p. Operating an educational order for gun parts

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- - - O How to make Artillery Cartridge Cases 10/2/40, 16p. Detailed manufacturing operations

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- - - O Anti-Aircraft Gun Barrels 12/25/40, 11p. Canadian practice on Bofors guns

- - - O Bullets for Britain 12/25/40, 6p. Canadian practice on small-arm ammunition and shells

- - - O Rear Sights for Browning Machine Guns 1/8/41, 10p. Information on manufacturing

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- - - O Machine Work on Trench Mortars 4/16/41, 12p. Detailed operations for production

- - - O Bore Operations on Medium Caliber Guns 4/30/41, 12p. Detailed operations for production

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- - - O From Motor Cars to Machine Guns 7/23/41, 20p. Conversion of General Motors plants to machine gun production

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- - - O Standard Machine for Shell Production 8/20/41, 13p. Detailed operations for production

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- - - O Producing Percussion Fuses 10/1/41, 5p. Production information

- - - O Shell Cases Made in Canada 10/15/41, 9p. Production information

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- - - O Aircraft Bomb Fuses 12/24/41, 11p. Details of production operations

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- - - O Converted Lathes Machine H. E. Shell 4/16/42, 13p. Details of manufacturing operations

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- - - O Machine Guns from Task Operations 4/30/42, 5p. Description of operations and equipment

- - - O Percussion Fuse for Small Shell 5/14/42, 16p. Detailed operations

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- - - O Line Production of Shell Cases 5/28/42, 8p. Detailed operations

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- - - O Shell Fuses by the Million 7/23/42, 20p. Detailed operations

- - - O Converted Lathes Win War Work 8/6/42, 3p. Conversion of old lathes for war work

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- - - O Gadsden Feeds the 105's 3/4/43, 16p. Details of operations

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- - - O Boys Anti-Tank Guns Made in Canada 3/18/43, 10p. Detailed operations

- - - O Precision Coating of Shell Cases 4/1/43, 2p. Automatic spraying

- - - O Shell Made in Small Shop 4/15/43, 9p. Operations and equipment used

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- - - O Chrysler Builds the Bofors Gun 4/29/43, 16p. Detailed operations

- - - O Breech Bolts for Boys Anti-Tank Rifles 5/13/43, 3p. Machining operations

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- - - O Naval Ordnance Plant Builds 5-In Guns 7/19/45, 6p. Methods and equipment

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ASVO Induction Hardens Tricky Machine Tool Parts 7/3/47, 4p. Coils and fixtures for special parts

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ASVO Bright Hardening and Tempering Tiny Parts 2/12/48, 4p; 2/26/48, 4p

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ASVO How to Design Work Coils for Induction Heating 8/12/48, 12p 20¢

ASVO Which Atmosphere for Heat-Treating and Brazing 1/13/49, 5p. Characteristics of controlled atmospheres

ASVO How to Handle Parts in Induction Heating 4/7/49, 5p

ASVO Induction Does Some Odd Jobs 4/21/49, 3p. Design of special coils

ASVO How to Heat-Treat Spur Gears by Induction Heating 7/28/49, 12p

ASVO Induction Heating Solves Hardening Problems 8/25/49, 3p

ASVO How to Cut Heat-Treat Costs 7/24/50, 6p

ASVO Carbon Restoration Overcomes Soft Skin on Parts 8/21/50, 8p. 15¢

INSPECTION

- S - - X-Ray in An Arsenal 11/13/40, 2p. Description and use of X-ray machine

- - V - Machine-Made Inspection 8/20/41, 4p

A- - - Fixtures for Checking Aircraft Engine Castings 2/19/42, 4p. Special fixtures speed casting inspection

ASVO Gage & Cutter Conservation in Canada 4/2/42, 8p. Controlling and checking gages and tools

ASVO Production With Precision 4/30/42, 1p. Necessity for accurate inspection

ASVO Glass for Precision Gages 2/4/43, 5p. Description of glass gages

A- - - Bearing Inspection Without Contact 8/19/43, 4p. Gaging by means of an air gap

A- - - Allison Eliminates Faulty Castings by Use of Target Inspection Fixtures 3/16/44, 11p

A- - - Plastic Masters Assure Accurate Checking of Assembly Jigs 10/26/44, 5p

- - -O Portable Hydraulic Unit Checks Bomb Lug Welds 3/29/45, 1p

A-V- Progressive Inspection Stations Assure Accuracy of Piston Rings 4/12/45, 4p

ASVO Air Gages Speed Inspection 6/21/45, 5p

ASVO Non-Destructive Testing Methods 5/23/46, 24p 10¢

ASVO Methods of Thread Gaging 7/4/46, 5p

ASVO Essentials of Air Gaging 1/2/47, 4p

ASVO Multiple Air Gaging Operations 2/30/47, 3p

ASVO How Smooth is Smooth? 9/9/48, 16p; 9/23/48, 12p. Specification and evaluation of machine finishes

ASVO Why Taper Threads Don't Fit 1/13/49, 5p

ASVO Practical Application of Surface Finish 1/13/49, 10p

ASVO Rapid Tests for Identifying Alloy Steels 2/24/49, 12p 20¢

A- - - Master Measuring System Checks Jet Engine Blades 9/22/49, 5p

ASVO Odd-Sized Holes to Millionths 12/1/49, 4p. Procedure for transferring precision dimensions

ASVO Optical Tools for Shop Precision 12/15/49, 8p 15¢

ASVO Electronic Gages Solve Various Problems 9/18/50, 5p

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- - -O Miscellaneous Press Tools 11/1/39, 3p. Design principles

A- - - Wings of Metal 12/13/39, 2p. Production of aircraft skin

- - -O Cartridge Case Technique 2/7/40, 4p. Steps in producing brass cartridge cases

A- - - Aviation's Rubber Stamp 4/3/40, 3p; 4/17/40, 3p. Guerin rubber die process

A- - - Plane Parts from Strip Stock 6/26/40, 3p. Structural shapes produced by roller dies

A- - - Vega Applies Cast Dies 1/8/42, 5p. Method of producing Kirksite dies

ASVO Aluminum Can be Deep Drawn 4/2/42, 5p. Description of methods and materials

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A - - - Punches Cut Their Own Dies 8/6/42, 4p. Inexpensive dies for aircraft
- - - O A Positive Stripper for Shells 10/29/42, 1p. Stripper for removing cartridge cases from punch
A - - - Low Cost Dies for Aircraft Parts 11/12/42, 8p. Dies for thin sheet-metal work
A - - - Dies for Stirrup Springs 12/24/42, 3p. Dies for making fuse parts
A - - - Plastic Punches are Tough 2/4/43, 4p
- - - O Hot Cupping Used by Buick for 75-mm Steel Cartridge Cases 5/13/43, 8p
A - - - Plastic Reduces Cost of Piercing Dies 5/27/43, 4p
- - - O Cartridge Tools Made for Long Life 7/8/43, 4p
- - - O Steel Cartridge Cases for 37-mm Shell 7/22/43, 12p. Detailed production operations
A - - - Selection of Stretch Press Form Blocks 8/5/43, 4p
A - V - Development in Stretch Presses 8/19/43, 4p. How stretch forming works
A - V - The Technique of Stretching Aluminum 9/16/43, 4p. How to perform stretching operations
- - - O Manufacture of 20-mm Steel Cartridge Cases 11/25/43, 11p. Manufacturing operations
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- - - O Hobbing Speeds Production of Bullet Dies 3/30/44, 4p
A - - - Airplane Tank Demonstrates Forming of Magnesium Sheet 6/8/44, 3p
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A - - - Draw Presses Simplify Metalworking Jobs 10/26/44, 2p. Draw dies replace drop hammers
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A - V - Production Planning for a Rubber Press Department 7/19/45, 5p. Economics of rubber press forming
A - - - Annealed Aluminum Alloys Respond to Hot Forming 11/8/45, 5p
A - - - Aluminum Alloy Strain Distribution at Elevated Temperatures 11/22/45, 4p
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ASVO Cemented Carbides Make Die Materials 9/12/46, 5p. Latest experience with war-developed applications
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ASVO Select Spring Strippers According to Die Requirements 11/17/49, 3p. Design of spring stripper plates
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ASVO Eleven Ways to Use Die Springs 12/1/49, 3p. How to avoid troubles in common applications
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- - V - Knocking Out Sprockets 6/12/40, 2p. Notching and flame hardening
ASVO Welding for Defense 10/16/40, 7p. Types of welding equipment
- - - O Welding Plays Top Roll in A.A. Gun Recoils 11/26/42, 12p
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ASVO Automatic Carbon Arc Welding Found Advantageous for Aluminum 4/26/45, 2p
- - - O Shell Case Output Doubled by Arc-Welding Procedure 5/10/45, 1p. Description of welding method
ASVO Fundamental Data on Oxyacetylene Cutting Technique 7/19/45, 3p
ASVO Shaped Guides Increase Accuracy in Manual Torch Operations 8/2/45, 4p
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ASVO Methods for Controlling Plate Motion During Flame Cutting operations 10/11/45, 4p

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ASVO Manual and Automatic Tracers Require Accurate Templets 10/25/45, 5p

ASVO Cost Reduction Aspects of Flame-Cutting Operations 11/8/45, 4p

ASVO Stack Cutting of Thin Plates Produces Parts of Identical Contour 11/22/45, 4p

ASVO Oxyacetylene Cutting Tactics for Various Alloy Steels 12/6/45, 3p

ASVO Torches Pinch-Hit in Machining Operations 12/20/45, 3p

ASVO Flame Cutting Steel Under Water 1/31/46, 4p

ASVO Acetylene Proves Economical in Flame Cutting Steel 2/14/46, 2p

ASVO Resistance Welding 8/1/46, 4p. What it is and how it works

ASVO Flash Welding is Versatile 8/29/46, 4p. Justification for use on limited quantities

ASVO Well-Planned Tooling Makes Sound Flash Welds 9/12/46, 4p; 9/26/46, 3p

ASVO How to Pressure-Weld Hollow Parts 10/10/46, 3p

ASVO Continuous Furnace Brazing 7/3/47, 2p; 7/17/47, 3p; 7/31/47, 3p

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ASVO Defects in Aluminum Alloy Spot Welds 6/17/48, 4p. Causes and remedies

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ASVO Basic Rules Govern Welding Fixture Design 12/15/49, 4p

ASVO Tricky Techniques Help Resistance Welders 1/9/50, 5p

ASVO How to Get the Most Out of Resistance Welding Equipment 4/17/50, 5p

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- - - **O** Acetone-Dry Ice Method of Assembly 4/6/38, 3p. Shrink fitting gun mounts

A - - - More Clippers for the Atlantic 3/20/40, 5p. Assembly methods on Boeing Clippers

A - - - Fabricating the Flying Fortress 7/10/40, 2p. Assembly methods at Boeing

A - - - Jigs for Airplane Assembly 8/7/40, 4p; 8/21/40, 4p. Large assembly jigs at Republic

A - - - Flush Rivets for Speedy Airplanes 5/14/41, 6p. Flush riveting to close tolerance

A - - - Conveyors Speed Plane Production 8/6/41, 4p. Use of line conveyors at Vultee

A - - - Three-Dimensional Views Boost Plane Production 5/28/42, 5p. Application of perspective drawings to assembly

A - - - Smart Tooling Spurs the Mustang 8/20/42, 8p. Assembly methods at North American

A - - - Unleashing the Thunderbolt 10/15/42, 16p. Construction and assembly details

- **S** - - How Kaiser Builds Liberty Ships 11/12/42, 10p

A - - - Double-Deck Assembly of the Vega Ventura 2/18/43, 9p

A - - - Timed Operations Pace Conveyors in Vengeance Bomber Assembly 4/1/43, 12p

A - - - Steel Casing Retools the Mustang 5/13/43, 5p. Use of special assembly fixtures

A - - - Final Assembly of the Coronado 6/24/43, 3p

A - **V** **O** Behind the Assembly Line 7/8/43, 4p. Importance and operation of feeder departments

A - - - Building a Dive Bomber 9/2/43, 5p. Assembly operations at Douglas

ASVO Air Tools Facilitate Assembly Operations 3/16/44, 1p

A - **V** - Shrink Fit Assembly of Cylinders is Done on a Special Press 5/11/44, 2p. How cylinder barrels are assembled

A - - - Tooling Dock Speeds Airframe Fixture Assembly 5/25/44, 12p. Special fixture for aircraft assembly

A - - - Fixtures Facilitate Assembly of Struts 7/20/44, 1p. Description of assembly fixtures

A - - - Interchangeable Assembly Units Coordinated by Master Tooling 2/15/45, 5p

A - - - Subassembly Roller Dollies Provide Quick Transportation 4/26/45, 2p

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A - - - Well-Planned Assembly Layout Behind the Black Widow 6/5/45, 5p

- - - **O** Nazi Assembly Technique on V-2 Bombs Revealed in Underground Factory 8/16/45, 3p

A - - - Rubber Inserts Cut Riveting Troubles 9/27/45, 2p. Rubber cushion reduces shock to operators' bodies

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A - - - Landing Gear Forks Welded at Glenn L. Martin 5/4/38, 3p. Assembling and welding stampings

- - - **O** Welded Mounts for Air Defense 5/31/39, 6p. Production of anti-aircraft gun mounts at York Safe & Lock

- - - **O** Arc Welded Gun Carriages 9/17/41, 11p. How 37-mm anti-aircraft gun carriages are welded

A - - - Welding Jigs for Nacelle Subassemblies 10/1/42, 3p. Special tools for spot welding

- - - **O** Fixtures Simplify Welding of 155-mm Howitzer Carriages 4/13/44, 10p. Details of production operations

- - - **O** Special Welding and Machining Fixtures Used on 90-mm Anti-Aircraft Gun Mounts 4/27/44, 8p. Details of production operations

- **S** - - Patrol Craft Mass Produced on Welding Assembly Line 10/12/44, 5p

A - - - Fixtures Speed Welding of Magnesium Wing Tips 11/9/44, 3p. Design of welding fixtures

A - - - Conveyors Aid in Assembly of Auxiliary Fuel Tank for Planes 4/12/45, 3p. Welding and assembly methods

A - - - Flash Welding Proves Economical in Producing Crew Nacelle Spars 5/10/45, 2p

- - **V** - Silver Alloys Braze Auto Parts 1/31/46, 2p. Types of alloy for various types of joint

ASVO Silver Simplifies Shunt Soldering 2/28/46, 1p. High-frequency silver soldering

ASVO Furnace-Brazed Assemblies Replace One-Piece Units 9/9/48, 5p

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ASVO Skilled Workers for Tomorrow 11/1/39, 2p. Apprentice training in Detroit

A - - - Men Trained in Four Weeks 2/21/40, 2 p. Training course at Curtiss Airplane

A - - - First Aid for the Unskilled 6/12/40, 2p. Employee training at Wright and NYA

A - - - More Men More Planes 6/26/40, 3p. Employee training at Pratt & Whitney

A - - - Wanted: Skilled Men 9/18/40, 2p. Lockheed trains employees

ASVO Train Men for Your Job 2/5/41, 2p. A program for employee training

ASVO The Small Shop Can Train Men 3/19/41, 3p. How to handle apprenticeship in small shops

ASVO NYA Aids Defense Plants 4/2/41, 2p. National Youth Administration plan for training

ASVO Adult Training Grows Up 7/23/41, 2p. How machine operators are trained at Williamsport, Pa.

A - - - New Craftsmen at Bell Aircraft 8/20/41, 3p. How Bell trains new employees

ASVO Measurement of Mechanical Aptitude 9/3/41, 4p.

EMPLOYEE TRAINING . . . *continued*

How aptitude tests aid hiring

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ASVO Training Within Industry 2/5/42, 2p. Employee training at Westinghouse

ASVO Tests for Personnel Selection 2/19/42, 4p. Pre-employment tests used at LeTourneau

ASVO Training In a Job Shop 4/16/42, 2p. Training Methods at Boyar-Schultz Corp.

ASVO Wanted: One Million Supervisors 7/9/42, 3p. Methods of training supervisors

ASVO NYA Trains Welders 8/20/42, 1p

ASVO Teaching Aids for Inspectors 9/17/42, 3p. Novel devices help train inspectors

ASVO Written Tests Aid Worker Evaluation 10/15/42, 2p. How to determine whether the worker has learned his job

ASVO Dexterity Tests for Women Workers 11/12/42, 2p. Tests for mechanical aptitude

ASVO A Plus Training System 11/26/42, 3p. Employee training at Westinghouse

ASVO The Women Learn Fast 12/24/42, 3p. General Electric training program

ASVO The Tools of Our Trade 75¢ Consisting of: Hand Tools and Cutters 2/18/43, 16p; How to Run a Drilling Machine 5/27/43, 16p; How to Run an Engine Lathe 7/8/43, 16p; How to Run a Grinding Machine 9/2/43, 16p

ASVO Counselors Aid New Women Workers 3/4/43, 3p

ASVO Four-Point Training for Women 4/29/43, 3p. Training employees at Lodge & Shipley

A - - - Aircraft Welders Need Special Training 5/13/43, 2p. Employee training at Eastern Aircraft

A - - - A Tailored Training Program 6/24/43, 2p. Specialized training for specific needs at Wright Aeronautical

ASVO Engineering Courses Train Women 7/8/43, 1p

ASVO Conversion of Non-Essential Skills Fills Essential Jobs 7/22/43, 3p

ASVO Supervisory Training is Given New Foremen 9/16/43, 3p. Training within industry

ASVO Simplified Training Speeds Shell Production 9/30/43, 2p

ASVO Movies Go To Work 11/11/43, 3p. Motion pictures help train employees

ASVO Industrial Training Speeds Rehabilitation 3/2/44, 2p. War production jobs speed recovery of wounded men

ASVO Slide Films Form Basis for Shop Training 3/30/44, 1p

ASVO Aptitude Testing Improves Morale 4/13/44, 4 p. Application at General Motors

ASVO Eastern Aircraft Has Successful Plan for Hiring Veterans 4/27/44, 2p. Training method for war veterans

ASVO Military Training Techniques Suggest New Ideas for Industry 2/1/45, 5p

ASVO New Hiring Techniques Needed When the Veteran Comes Home 5/10/45, 4p

ASVO Common Sense Will Go a Long Way in Returning Veterans to Old Jobs 8/30/45, 4p

ASVO Tool Engineer Training Helps Prevent Production Errors 3/28/46, 5p

ASVO Apprentice Training Assures a Reservoir of Skilled Craftsmen 5/22/47, 16p 10¢

ASVO A Century of Apprentice Training 12/15/49, 3p. Apprenticeship system at Brown & Sharpe

ASVO Know Your Hand Tools 5/29/50, 12p 20¢

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ASVO The Working of Wrought Coppers and Brasses 12/14/38, 12p

ASVO Cold Forming Operations on Stainless Steels 5/3/39, 2p; 5/17/39, 3p

ASVO The Working of Wrought Bronzes 8/23/39, 12p

ASVO The Working of SAE Nickel Steel Alloys 10/18/39, 12p

ASVO The Working of High Speed Steels 2/21/40, 8p

ASVO What it Takes to Turn Stainless 4/3/40, 4p. Feeds, speeds and tool shapes

ASVO The Working of Magnesium Alloys 5/1/40, 12p

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ASVO The Working of Aluminum Alloys 8/21/40, 16p

ASVO The Working of Carbon Sheet Steel 10/16/40, 12p

ASVO The Cold Working of Sheet Aluminum 12/11/40, 3p; 12/25/40, 3p; 1/8/41, 4p; 2/5/41, 3p; 2/19/41, 3p; 3/5/41, 3p

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ASVO When You Machine Stainless 7/9/41, 2p. Properties to be considered

ASVO The Working of Nitriding Steels 9/3/41, 12p

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- SVO How to Machine Cast Armor Plate 9/17/42, 16p

ASVO The Working of National Emergency Steels 10/1/42, 12p

ASVO Salvage Campaign Yields Dividends 2/18/43, 3p. Salvage operations at Westinghouse

ASVO The Machining of Magnesium 3/4/43, 3p; 3/18/43, 3p; 4/1/43, 3p

A - V - The Working of Plastics 9/30/43, 10p. Mold construction and machining

ASVO The Working of Cast Copper Base Alloys 10/14/43, 16p

ASVO How to Determine the Proper Cutting Fluids 12/9/32, 3p

- - - O Conveyors Help Build Bombsights on Schedule 2/3/44, 10p. Automatic mass-production methods

ASVO Use of N.E. Types of Alloy Steels to Continue After the War 3/2/44, 4p

ASVO Post-War Steels Should Conserve Valuable Alloying Elements 3/16/44, 4p. Necessity for conservation

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ASVO Segregation of Metal Chips Simplifies Salvage Operations 8/17/44, 3p

ASVO Centralized Chip and Oil Salvage Pays Substantial Dividends 11/23/44, 4p. Salvage methods at Inglis

ASVO Many Factors Govern Selection of Abrasives for Blast Cleaning 3/1/45, 4p. How to select blast cleaning abrasives

ASVO Britain Guards Against Waste 5/10/45, 4p. Chip handling and oil reclamation at Rolls-Royce

A - - - Large Extrusions Replace Forgings in Making Inner Wing Spar Caps 5/24/45, 3p

ASVO Postwar Horizons for Powder Metals 8/2/45, 5p

ASVO Processing Techniques Affect Design of Powder-Metal Parts 8/16/45, 4p

ASVO Characteristics of Wrought Aluminum Alloys 10/11/45, 7p

ASVO General Rules for Powder Metallurgy 2/14/46, 2p. Effects of processing on physical properties

ASVO How to Work Stainless Steel 2/28/46, 20p

ASVO How to Work with Plastics 4/11/46, 20p

ASVO Machining Powder-Metal Parts 3/28/46, 1p

ASVO Processing Operations in Powder Metallurgy 4/25/46, 2p

ASVO Sapphire as a Production Tool 6/6/46, 4p. Characteristics and properties

ASVO How to Deliver and Maintain Lubricants 7/18/46, 20p

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ASVO Resistance Welding of Stainless Steels 11/7/46, 4p; 11/21/46, 5p; 12/5/46, 5p
ASVO Where to Use Low-Alloy, High-Strength Steels 12/5/46, 4p
ASVO How to Work With Cutting Fluids 7/31/47, 8p 15¢
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ASVO How to Finish Copper and Copper Alloys 2/26/48, 12p
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ASVO How to Work Aluminum and Its Alloys 7/1/48, 16p 25¢
ASVO Carbides Speed Copper Machining 10/21/48, 2p. Design of drills and threading tools
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ASVO How to Machine Beryllium Copper 2/10/49, 16p
ASVO Don't Fear Threading of Stainless 6/30/49, 3p. Selection of equipment and tools
A - - - Hard, Tough Alloys Can Be Machined 12/1/49, 2p Procedures and cutter angles
ASVO How to Work Clad Materials 2/6/50, 16p 25¢
ASVO How Tooling Affects Design of Metal Powder Parts 4/17/50, 5p 15¢
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ASVO How to Machine Plastics 6/26/50, 8p 15¢
ASVO What Causes Distortion in Machining Aluminum 9/4/50, 2p.
ASVO How to Cut Costs With Cutting Fluids 9/18/50, 8p

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- - - O Artillery Ammunition 5/17/39, 4p. Problems involved in selecting production equipment
ASVO Industry's Part in National Defense 5/31/39, 3p. The industrial mobilization plan
A - - - Britain's Ready in the Air 7/26/39, 3p. State of British aircraft production
ASVO How Educational Orders are Placed 10/4/39, 2p. War department's method described
ASVO M-Day—1939 Version 11/1/39, 3p. War Dep't industrial mobilization plan
A - - - The Problem of Aircraft Parts 10/30/40, 3p. Troubles and remedies in decentralization
A - - - A Preview of Plant Layout 5/14/41, 2p. How Wright Aeronautical revised production lines
ASVO Subcontracts Speed Production 7/9/41, 2p. How General Electric makes use of subcontractors
- - - O Inland Sites for New Arms Plants 12/10/41, 2p. Locations of new government munition plants
ASVO Team Work Wins War Contracts 2/5/42, 3p. How small plants combine to obtain war contracts in San Jose
ASVO Contracts, Prime and Sub 3/5/42, 3p. How contractors must work together for production
ASVO The Tool Engineer and National Defense 3/19/42, 2p. How tool engineering can cut costs
ASVO How We Sub-Contract 4/2/42, 4p. How Westinghouse operates its program
ASVO How to Convert 4/30/42, 2p. Suggestions for converting to war production
ASVO How to Do Business with Uncle Sam 7/9/42, 12p. How to obtain government contracts
- - - O Fuse Makers Speed Output by New Kind of Cooperation 9/17/42, 2p. Interchange of equipment speeds production
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ASVO The Finances of Wartime Tooling 3/18/43, 2p
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A - - - Wood Models Speed Plane Production 6/24/43, 7p
ASVO Sub-Contracting Made to Work 9/2/43, 4p. How American Type Founders operated its sub-contracting division
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ASVO Cost Cutting Clinic 10/6/49, 24p. Compilation of ideas for cost cutting 25¢
ASVO Selection of Transfer Machines for Medium Volume Production 2/6/50, 2p
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TANK REBUILDING

Activity grows daily on tank rebuilding lines at the Detroit Arsenal. Vendors arrive in a steady stream to bid on parts for existing and new tank models

Victory in South Korea was paced by medium tanks rebuilt in the Detroit Arsenal. Our troops received the Gen. Patton 90-mm gun tank in quantity because of a fortunate program devised in 1948 by Arsenal engineers

BY RUPERT Le GRAND, Associate Editor

TANK rebuilding is both feasible and economically necessary. New models are often an evolution of earlier designs. Many parts can be salvaged and combined with new parts to produce the improved vehicle.

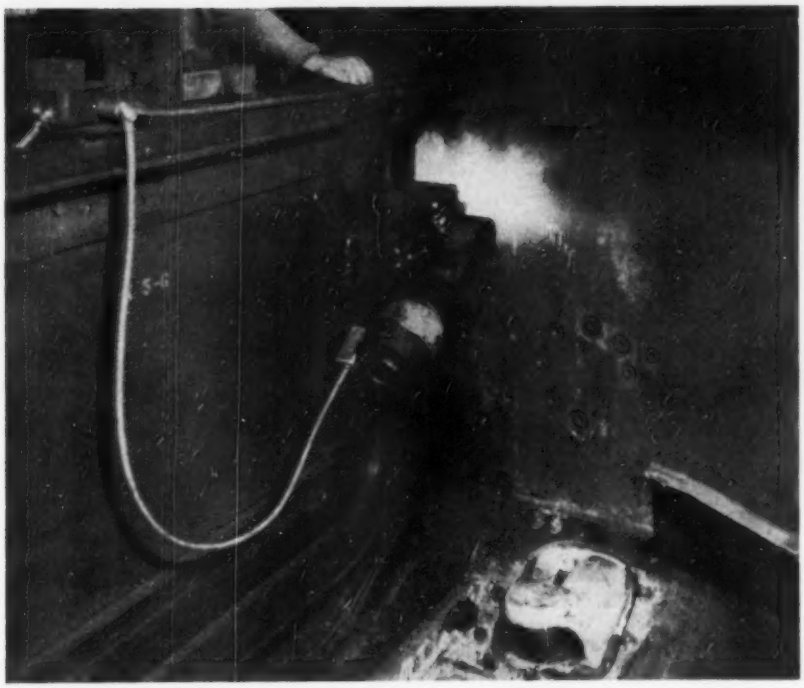
When World War II ended, we had large stocks of General Pershing medium tanks. These machines were powered with a water-cooled V engine and equipped with a manual-shift transmission. The Patton is basically of the same general design as the Pershing, but is driven by a Continental 12-cyl air-cooled engine that supplies considerably more power. When this engine is coupled to an Allison torque converter transmission, the tank has greater speed and maneuverability than its predecessor.

The major conversion job involves making more room in the hull to accommodate the new drive. Hence, the rear end of the hull is cut off and a new casting is welded in place. Many additional small parts are welded into the interior. The turret is overhauled. An improved wheel-suspension system is added. The 90-mm gun is modified and remounted. New treads are put on.

Logical rebuilding method is to lay out one line to dismantle the tank completely, and other lines to overhaul major components, then re-assemble. In the dismantling process, all parts are checked for condition. Those found satisfactory and usable in the Patton tank are saved. Of the new parts, about 80% are purchased, because it is current Arsenal policy to rely upon industrial suppliers as far as possible.

Most dramatic production line is that employed to rebuild the hull. Without adequate equipment,

SPEEDED BY FIXTURES



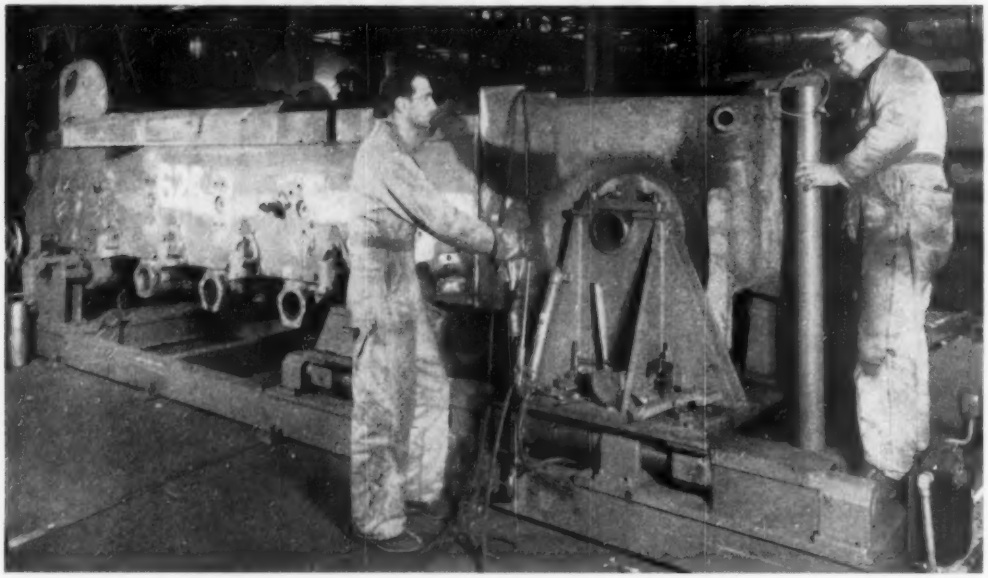
Rear end of hull is cut off with a portable burning machine, which is set at established locating points in the fixture. Thickness of metal to be cut varies, and metal is difficult to cut. Hence, to get enough heat, "Ferro-Jet" powder is fed into the oxyacetylene flame. Two torches are used, on opposite sides of the burning machine. Torches are set 22½° to hull surface, so that cut edge is scarfed for double-V joint. Each cut requires 20 to 30 min. Power-driven cutting head travels on a rack conforming to the hull cross-section. Cutting speed can be adjusted to section thickness. Upon completion of the two scarfing cuts, the 30-in. long discard is loosened in the fixture, then removed with a jib crane

this job would be an insuperable bottleneck. But here the fortunate decision of 1948 comes in.

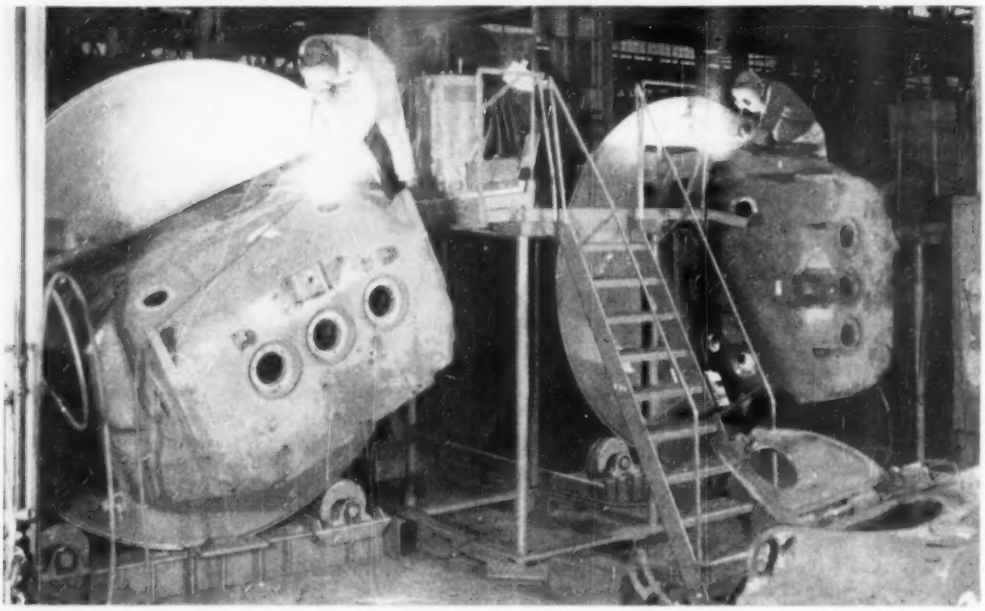
Tool engineers decided to obtain fixtures that would both expedite the rebuilding operation and insure the desired accuracy of locating new rear hull casting, welding and machining operations. Their ideas were shown to a number of vendors, fixture designs were obtained, and the logical designs were selected, considering accuracy of location, strength and ease of use.

In all fixtures, the same basic location scheme is employed: locating pins are inserted into suspension-support bores at the front and rear of the hull. The front pair of pins rest in V-blocks, the rear pair in half journals. This arrangement establishes the fore-and-aft position of the hull in the fixture and the height location. The longitudinal centerline of the hull is made to coincide with the fixture centerline by use of flush pins in the brackets containing the V-blocks and half-round journals. This locating procedure requires only few minutes.

By using this system of location, the hull is cut off square at the correct distance from the suspension-support bores. Next, the new rear hull casting is tack-welded in place with the rear-drive bores exactly spaced from the front bores and at the correct centerline and height. In the machining fixtures, the hull is quickly slipped into place. Required boring, drilling, face-milling and grinding operations are accurately performed with respect to the basic location. Thus, at final assembly, the component parts slip readily into place.

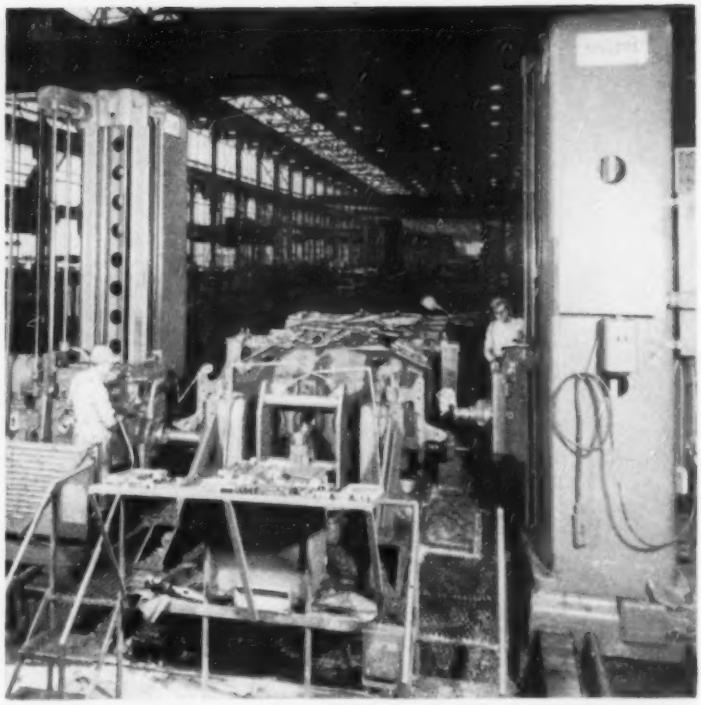


Tackwelding the new rear piece to the tank hull calls for precision location of the two components. First, the hull is located at four points with pins, and centered with flush pins. Second, the rear part is mounted on a sliding trunnion fixture that has means to adjust the height and lateral and longitudinal positions. The rear piece is jacked to height (shown being checked), leveled with jacks, and spaced with relation to hull by a loose gaging piece on each side of fixture. Tackwelds are made with stainless-steel rod

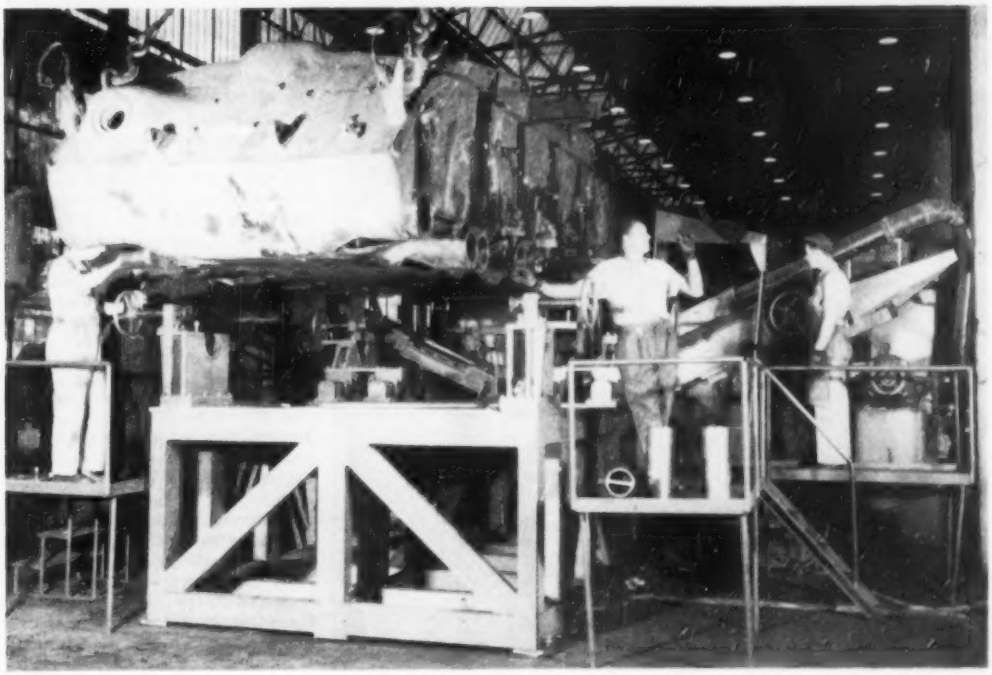


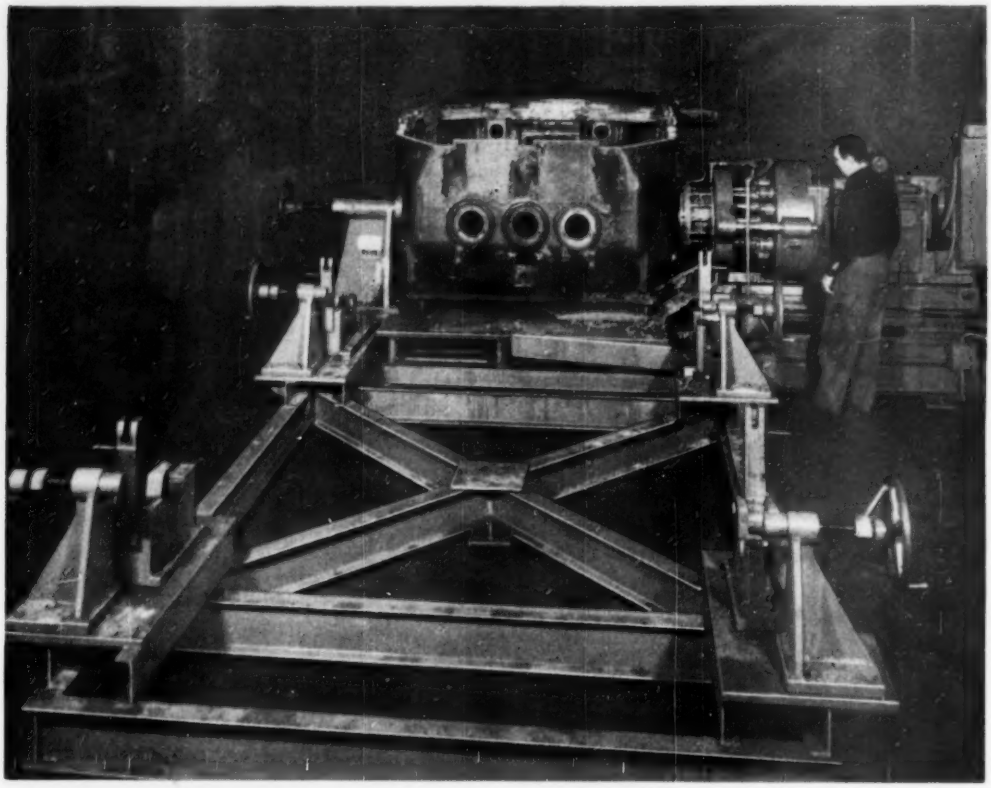
Final welding of the tackwelded hull assembly is carried out in several roll-over fixtures. The hull is located in the same manner as at prior fixtures. Stainless-steel rod (⅜ in. dia) is used at 600 amp. Three men work at each fixture: two on the double-V joint and a third on small parts. In an adjacent bay, many further details are added. More than 168 welding operations are carried out after cutting off the old rear end.

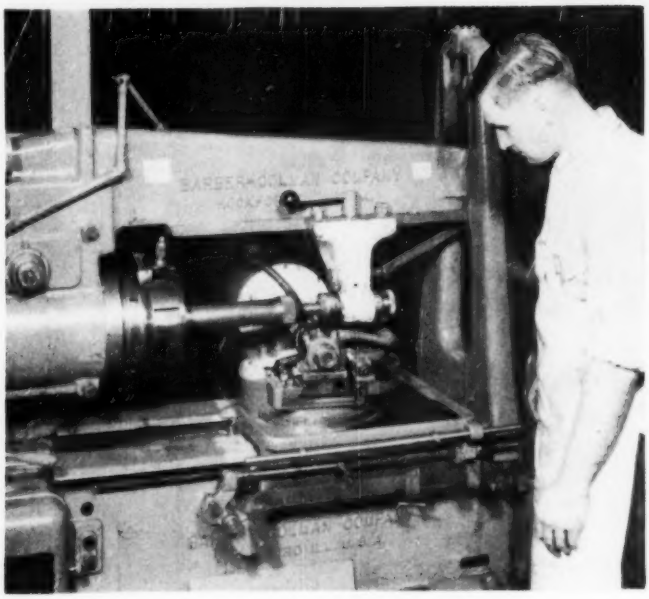
Boring the final drive hole on each side of the hull, plus facing and drilling a near-by pad requires both an adequate machine and fixture in order to obtain required accuracy. Once more the hull is located by pins entering V-blocks and half-round journals, and it is centered by flush pins. This operation completes the machining work on the hull, and it is removed to final assembly →



Angular pads on the bottom of the hull must be ground to locate support housings. The fixture holds the hull so that two angular grinding slides at rear can traverse the desired areas. About ½ in. of stock is removed by each 16-in. segmental wheel. The slides are positioned 25° to the horizontal. Grinding equipment was supplied by Blanchard and the fixture by Expert. Hull is shown being removed from fixture. Hollow pins used for location are shown on platform

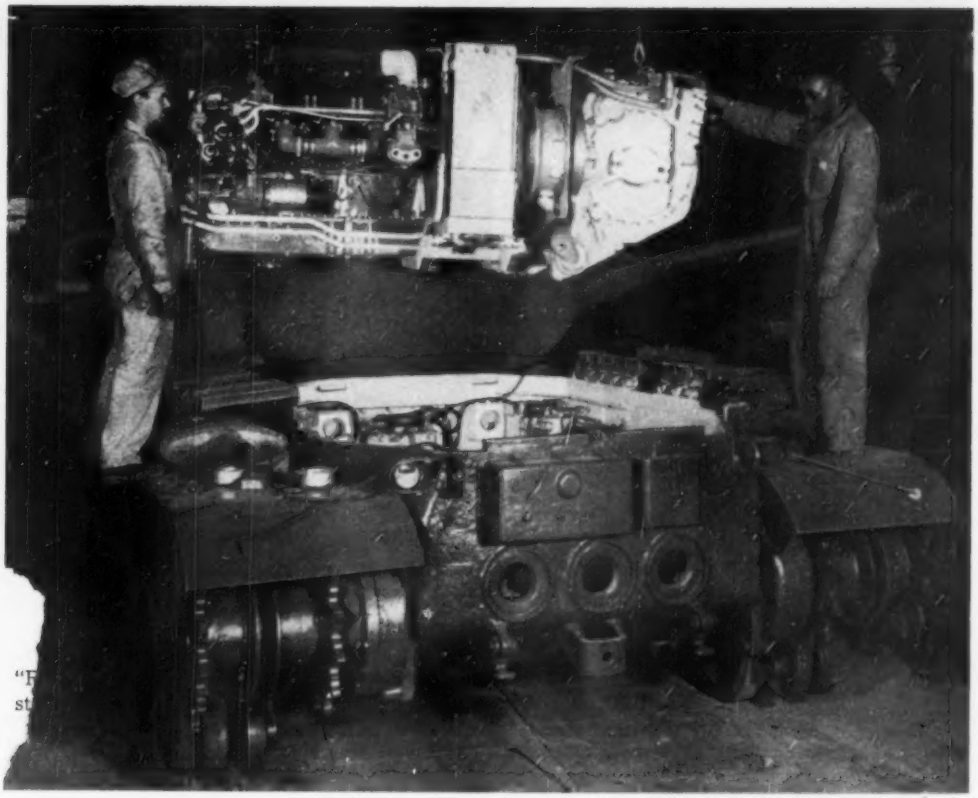




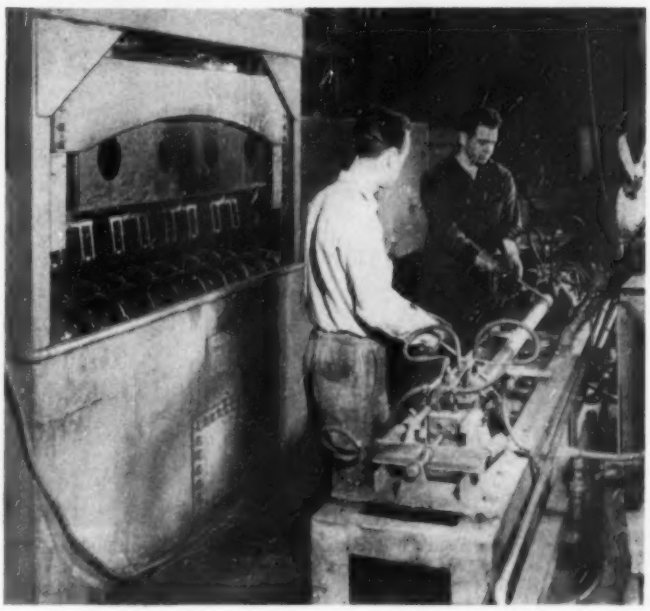


Bolt-hole drilling at final drive bores is done with a two-position fixture and a single horizontal machine equipped with 12-spindle drillhead. The rear of the hull is visible. After the twelve 1 1/32-in. holes are drilled on the right-hand side of the hull, the part is picked up by crane, turned 180° and placed in the fixture position seen in the foreground. Now, the left-hand final drive bore is in position for drilling bolt holes in the machined boss

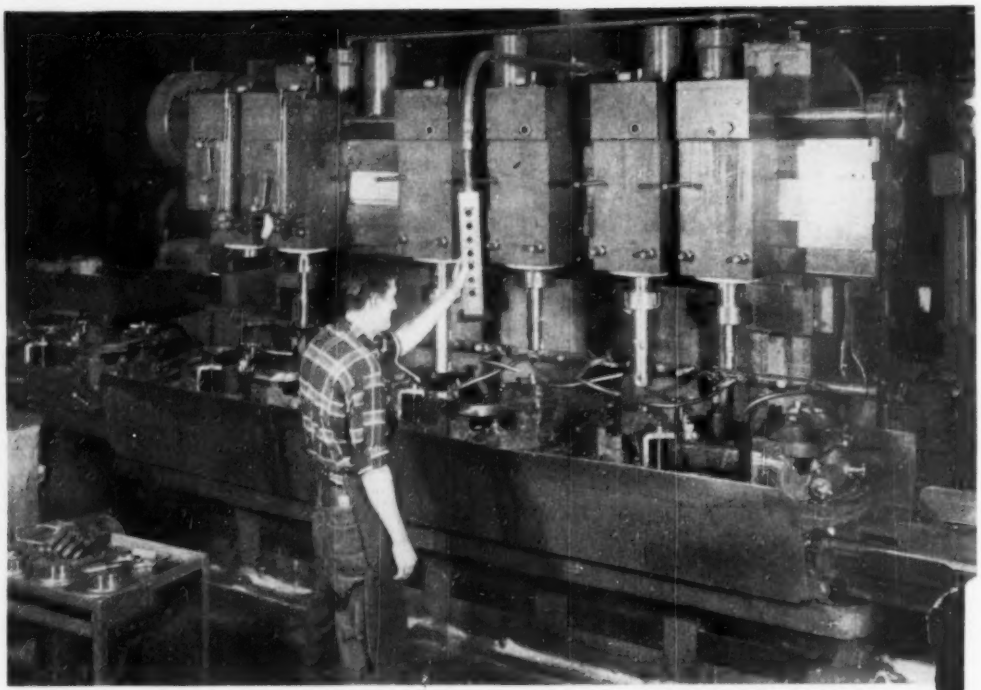
Torsion bars act as springs to support the wheel-mounting assemblies. Serrated locking teeth are cut at each end of the torsion bar after it has been hardened. High hardness is satisfactorily handled with T-1 and T-3 high-speed hobs. The long bar is held between centers. One center is located on the machine's over-arm, the other in a loose piece that is bayonet-locked into a work tube extending from left of the hobber



New power plant is major difference between new Gen. Patton tank and old Gen. Pershing medium tank. Twelve-cylinder Continental air-cooled engine is coupled to Allison torque converter. Tank driver manipulates only a wobblestick (for steering) and brake and accelerator pedals. After the power plant is dropped into the lengthened hull, the Gen. Patton is driven around the test track, inspected, adjusted, then shipped by flatcar



Induction heating is used to bring the torsion bar to the correct temperature for precision hardening. The piece is placed between air-operated clamps, each having an induction coil adjacent. When the bar has been heated to the proper temperature, a Brown optical pyrometer energizes a control circuit that cuts off the current and opens the clamps automatically. The two operators then transfer the bar to a Gogan roll-type quenching machine that insures straightness



Four fixtures expedite accurate boring of five holes in front wheel arms. These fixtures are slid from station to station on rails and locked with pins. Station 1 handles a large hole at one end of the bellcrank-like part and a small hole. Station 2 bores the large ho opposite end of piece and a small hole. Station 3 fini a small hole. To unload a fixture, it is run out at le machine, then returned by crane to loading stati

Turrets are reconditioned on fixtures equipped with a raceway like that mounted on the tank hull. Thus, the turret can be swiveled at will while parts are added. The 90-mm gun is checked separately, then assembled to the turret. This line for M-26 turrets is similar to Patton-turret line

ROUND TABLE

Skill Stealer

"Remember George Ralls, Ed?" asked Al as he stopped in the tiny office on his way to lunch.

"Sure, Al. He was foreman of the pressroom —left about a year ago to take a good offer from Gibbons Manufacturing. How is he?"

"Okay, I guess," replied Al as he scraped a chair along the floor and tipped it back against the wall. "He's too darned healthy, looks like. Seems he's been stealing some of our help."

"Now wait a minute, Al. I wouldn't accuse George of a thing like that without plenty of proof. He was a good man, and he left this outfit with no hard feelings on either side. Are you sure of your information?"

"As sure as you can be. Seven press operators have left the department, all in the last four months, and every one of them is working for Ralls, now."

"Well, maybe you're right; but you still can't blame it on George. What the heck; maybe they all found that Gibbons was a good place to work!"

"All in four months, and all working for Ralls now? G'wan, Ed, you know Ralls got them over there. It's obvious."

"All right, let's assume he did. Now what you goin' to do about it? We can't take court action as far as I know; and we can't very well go over there with shotguns and bring the operators back. Looks like we're stuck."

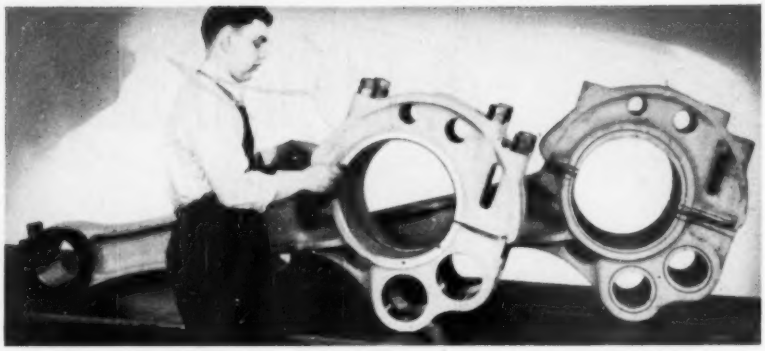
"Well, maybe, but I'd sure like to see them do something. Harrison is pretty worked up about it—mainly because the press department has had to train seven new operators practically at one time."

"Oh, let Harrison roar all he wants. This business is a dog-eat-dog affair, and once in a while you're bound to get the short end of the stick."

"There's no reason why we can't have free enterprise without the dog act. It's a matter of ethics, to my way of thinking, and it reflects on the man who encourages a practice that is destructive to his former employer."

"I don't imagine George is worryin' much about ethics. He's probably sweatin' bullets, trying to get out a tough press job."

IS LABOR STEALING *as much of an offense as Al thinks? What can be done about it? Does it really reflect badly on the one who indulges, or is he admired for his nerve and influence? Discussions of earlier topics appear on later pages.*



Connecting rods for big gas and diesel engines weigh 1600 lb, measure 5 ft long; yet are bored to 1/1000 accuracy in 1/12 the time required for conventional single-point-tool methods

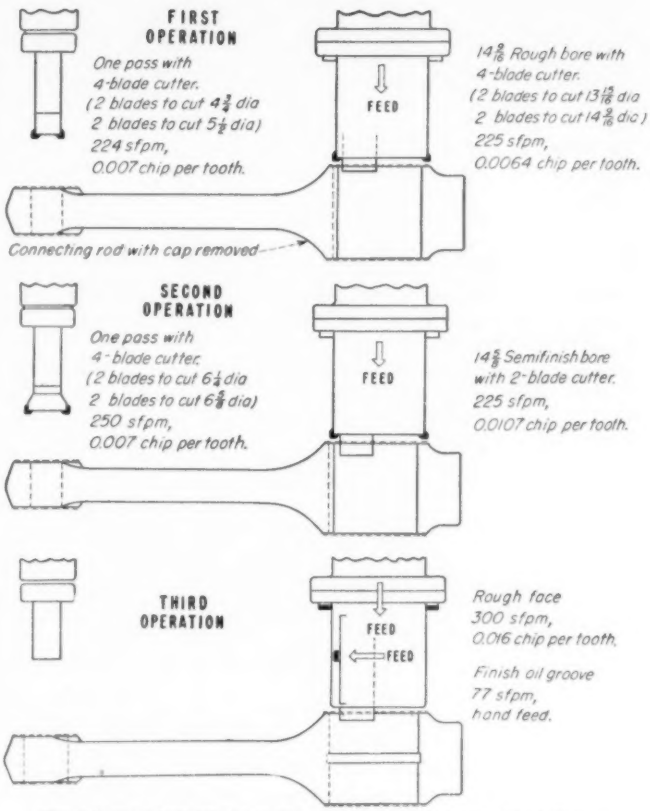
BORING THE BIG RODS

BY J. A. STEVENSON
The Cooper-Bessemer Corp., Grove City, Pa.

Two spindles bore twice as fast as one, but adding multiple cutters and a hand-advanced cross-slide to a rail-type boring mill increased production 12 times over the output of a single-spindle, single-tool boring setup. By investing nearly $100,000, Cooper-Bessemer Corp. reduced boring time on connecting rods from 12½ hours to 61 min.

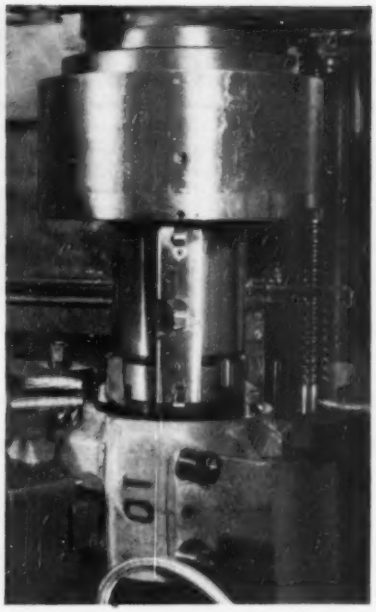
CAST alloy-steel rods for engines that take up to five such rods are bored in a process originally worked out to save labor costs. The method did that, but also increased accuracy in the product without requiring the services of exceptionally skilled operators.

Two separate setups are made on the two-spindle boring mill. The first is with the casting alone, so roughing cuts can be taken on both bores and the top face of the crank end of the rod. Separate locating points align the work for the second setup. Here the cap is

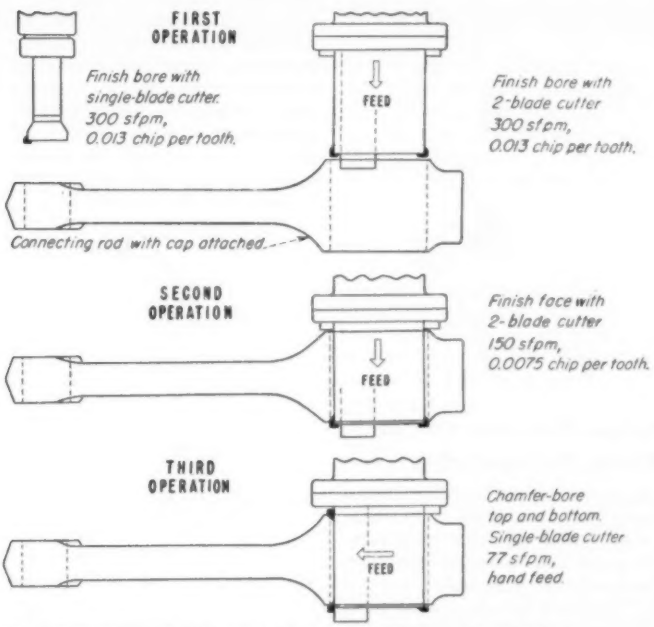


Operations on first setup are two roughing passes (both bores), then rough facing and oilgrooving on crank-end bore

Two-spindle vertical machine cuts piston- and crank-end bores in two setups on the same special fixture, one without the crank-end cap, and one with the cap attached



Multi-purpose cutter head has multiple tool slots and special built-in cross-slide that advances a toolbit to groove the bearing surface


FIRST OPERATION
Finish bore with single-blade cutter. 300 sfpm, 0.013 chip per tooth.
FEED
Finish bore with 2-blade cutter 300 sfpm, 0.013 chip per tooth.
Connecting rod with cap attached.
SECOND OPERATION
FEED
Finish face with 2-blade cutter 150 sfpm, 0.0075 chip per tooth.
THIRD OPERATION
FEED
Chamfer-bore top and bottom. Single-blade cutter 77 sfpm, hand feed.

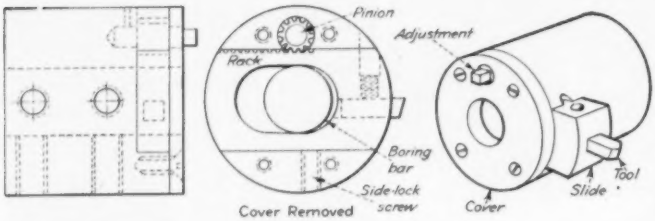
Operations on second setup are single-point finishing on piston-end bore, finish-boring crank end with two-bit cutter (two strokes), and finish-facing of crank end. Cross-slide has two chamfering bits here, and advances to chamfer after facing operation

attached to the crank end of the rod, and the bearing surfaces are finished to an accuracy within ±0.001 in size, 0.0016 in roundness, 0.001 in spacing, and 0.0015 in parallelism in 10 in. of length.

Regular external cutter bits are ground and set to gages, then inserted in holding slots in the twin heads. For the grooving and chamfering operation on the crank end of the rod, a special cross-slide is fitted with tools and hand-fed by separate machine controls that work through the spindle.

Roughing takes off as much as 1 in. of stock on each side of each bore, while finishing cuts take off up to ⅛ in. of stock. Both setups have two bore-cutting cycles with different toolbit arrangements, and the spindle at the crank end has one additional cycle each time for the grooving and chamfering strokes, which are combined with facing operations. Although the roughing cuts are heavy and interrupted—causing power surges—accuracy is better than with older methods and single-spindle machines.

Practical Ideas



Geared Boring Toolholder Has Rigidity and Accuracy

THIS TOOLHOLDER has been utilized on horizontal lathes, Gisholts, and boring mills. It is both sturdy and accurate because of the heavy design and the principle of tool advance, which is controlled through a gear that moves the toolholder slide forward.

The body of the holder is a heavy tube or collar, bored out to slip over a regular boring bar, and equipped with setscrews that clamp against the bar to steady the holder. A slot is milled across the end of the body to take a flat insert, and a cover—also bored to clear the bar—is screwed to the end of the body. The insert, which is really a toolholding slide, is drilled and milled to hold the toolbit at its outer end by means of another setscrew.

An oblong hole which clears the bar and allows the insert some extra clearance in front and rear is milled out. The top edge of the insert is cut to a rack profile to match a small spur gear inserted in the body and held on a short shaft.

Bearing surfaces for the shaft are bored both in the body and in the cover, and an oil hole is provided in the body. The outer end of the stub shaft is milled to a square section so a wrench can be used to turn it, thereby turning the gear (which is keyed to the shaft) and moving the toolholder insert forward or backward.

As much tool advance as is required can be provided for by making the toolholder insert long and milling the clearance hole long. An advantage of the design is that the outer end of the boring bar may be supported on heavy work because it goes through and clears the toolholder. *Justo P. Ramirez, Tocopilla, Chile.*

Copper Plating on Clamps Resists Weld-Spattering

HERE IS AN IDEA that has proved quite useful in welding shops where weld spatter gets onto everything in sight and generally fouls up much of the equipment.

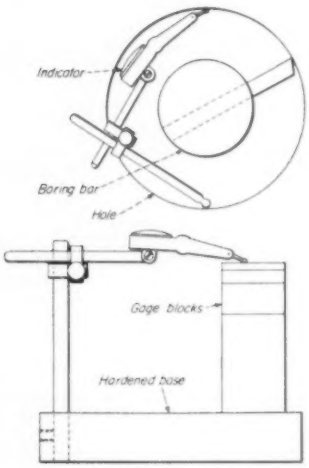
To protect the action of common C-clamps, which are about the most useful tool in a welding booth, we apply industrial copper plating about 0.0005 to 0.0008 in. thick to the exposed threads and head of each screw. This greatly reduces, and often eliminates, the accumulation of weld spatter on the clamps; which means that they will not jam easily. *Clement F. Brown, Lima, Ohio.*

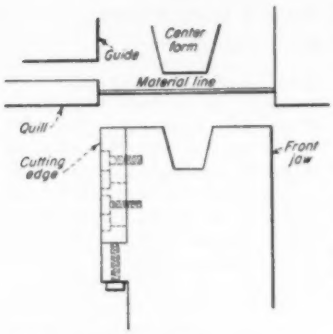
Dial-Indicator Assembly Gages Unusual Jobs

WHEN I CANNOT use an inside micrometer or vernier or plug gage to check the ID of a hole (as, for example, when checking a bored hole while the work is still set up on the machine), a surface gage, a cross bar, a swivel clamp, and a dial indicator will serve.

With the components assembled as shown, a reading can be taken by setting the dial indicator to zero, then removing it and comparing it to a micrometer or vernier gage. This method is quite accurate.

A similar method works for checking vertical heights of parts. The gaging assembly is mounted in hardened - and - ground surface plate, and gage blocks are built up to the required height. If the indicator is set to zero on the blocks, comparison of parts is simple. *Roal J. Chevrette, Woonsocket, R. I.*

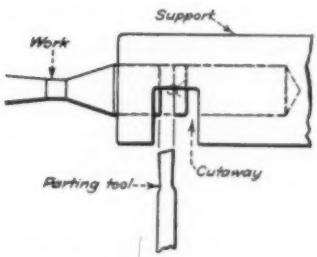




Adjustable Jaw Insert Can Be Resharpened

TO ELIMINATE the complete grinding of any kind of front jaw or punch that cuts material to length before forming, a removable side block can be added to the cutoff side of the jaw. When the cutting corner becomes worn, the block can be removed, sharpened, and installed again.

The jaw is mounted in a suitable notch, and is held by screws through slots—thus allowing vertical adjustment. A screw through the jaw and contacting the end of the block can be turned to adjust the block's position after it is reassembled. *Charles A. Lauer, Ft. Wayne, Ind.*

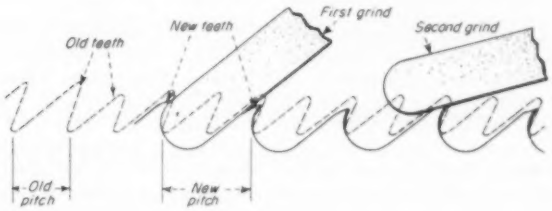


Cut-Away Support Helps Stock Cutoff

CENTERED ENDS on lathe products often are undesirable; and although they can be cut off with a standard parting tool, less stock will be wasted if the work is not held by the tailstock during this operation. This bronze support holds small shafts for the removal of centered ends so no more stock than necessary will be cut.

The bronze bar is machined outside to fit in a turret hole, and is drilled for a slip fit around the shafts. A cut-away section on the front side of the bar allows entrance of the parting tool, which has to feed in only to the center of the work. The bar provides accurate, steady support for the work as it is held in a collet. *Albert E. Reiff, Farmingdale, L. I., N. Y.*

INTERRUPTED LATHE CUTS, as on shafts that have keyways already formed, can be smoothed out by adding a brake to the lathe. Loop a leather belt around the smooth OD of the chuck, anchor it at the back of the bed, and adjust the tension until the chuck runs smoothly, even through the shock at the keyway. This reduces strain on the lathe gears and makes the tool last longer. Accuracy and finish on the work is also improved. *Federico Strasser, Santiago de Chile.*



Offhand-Ground HSS Saws Double Cutting Rate

THERE ARE NO high-speed power-saw blades produced in this country (Australia), so we are dependent on England and the United States. Unfortunately, the supply is uncertain, and saws are often unobtainable.

I made an important discovery not long ago through sheer accident. Our steel-yard man was trying to keep ahead of a 3-in. automatic chucking machine by cutting stock, four lengths in each of two vises, with two saws. The blades were 14 in. by 1½ in., and would normally have been 6 tpi, but the only blades available were 10 tpi.

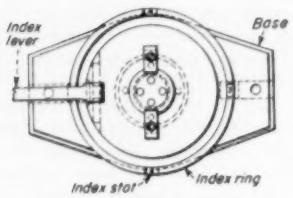
Being a cooperative man, he approached me and admitted that the automatic's cycle of 70 sec was beating him and he was down to only one spare saw. On inspection of the old blades, it was apparent that:

1. The blade steel was too soft.
2. Chips were sticking between the small teeth.
3. The blades were still whole above the teeth, which was lucky.

We experimented by grinding, offhand, to change the 10-tpi blades to 5 tpi. Because the grinding was offhand, the teeth formed were not exactly even, which seemed to help the cutting action. With the larger teeth formed, chips would coil and fall out, clearing the teeth rapidly. The output of the saws was more than doubled.

Over a period of six months we developed the technique of wearing down the 10-tpi saw blades on small bars and light stock, and when really heavy cutting had to be done, we ground off alternate teeth to form 5-tpi blades in two simple operations. Time per blade was only 5 min for sharpening, and each successive sharpening seemed to extend the cutting rate of each blade as much as 30%.

Sharpening is done with a cutoff wheel that is 3/32 to ⅛ in. wide. The first operation forms the throat of each blade, and the second grinds the clearance. *Neville Palmer, Sydney, Australia.*



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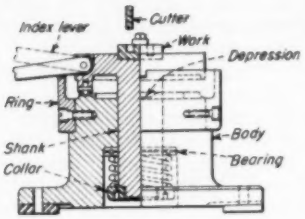
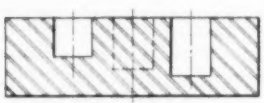


Side

Automatic Depth Control Built Into Disk-Drilling Fixture

LARGE QUANTITIES of circular steel disks had to be made with four holes in one face; all holes to be blind and finished square at their bottoms, and all holes on the same pitch line around the disks. Unfortunately, all depths were different, although all diameters were 0.250 in. Depth control had to be accurate within 0.002 in., and this proved to be a problem with conventional manufacturing methods.

A special drilling fixture that was equipped with automatic depth control was made up to fit on the table of a drilling machine. The cast-iron body was fitted with tongues, and was drilled through the center (vertically) to take a shank on a round table. The lower part of the body was bored out to admit a compression spring and ball thrust bearing that worked against a check collar threaded to the end of the shank. These parts kept the round table down against the body of the fixture.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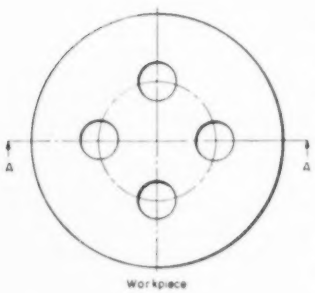


To make indexing the work accurate, an indexing ring was mounted outside the body and projecting up slightly above it. This ring was milled in four quarters to provide slots in which a lever would fit to prevent rotation of the table once it was in position. The lever, pinned to the table, was raised out of each slot when the drilling at that position was completed.

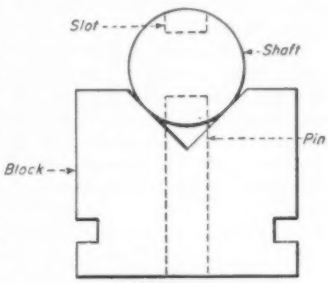
Work was clamped by means of two straps into a shallow hole milled in top of the table. To insure that the hole depths were accurate, the down-feed of the end-milling cutter in the drill spindle was limited by a stop on the machine, and a roller track was milled into the top of the fixture body. The track dipped at each quarter turn to the correct relative depth so the table—supported against spring pressure by a small roller pinned into a recess under the table—would raise or lower.

Because accuracy depended on the roller track, and not on the depth of feed of the drill spindle, the fixture turned out disks to the exact specifications. Production was fast, convenient, and uncomplicated because all the hard work had been taken out of the job when the fixture was designed and built. *W. M. Halliday, Southport, England.*

Ground Scale Allows For Finish Cut

WE CUT a lot of ring grooves in our shop, so one day I took an ordinary 6-in. scale and ground 1/64 in. off the low end. This made all diameter readings 0.015 in. low, which allowed that much on the diameter for a finishing cut. When the scale read 1.500, for example the actual dimension was 1.485 in. This was ideal for internal cuts.

For the same problem in making OD cuts, I added 0.015 in. to the other end of the scale by building it up. This end of the scale would then read 1.500 when the dimension was actually 1.515 in., again allowing 0.015 in. for a finishing cut. To make sure I never made a mistake, I painted copper sulphate on both sides of the shortened end of the scale. *Orville S. Kilbourn, Montebello, Calif.*

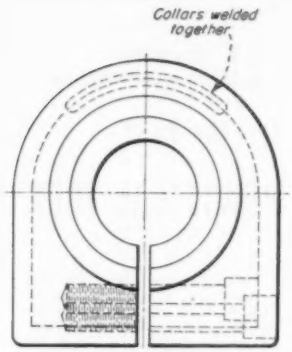


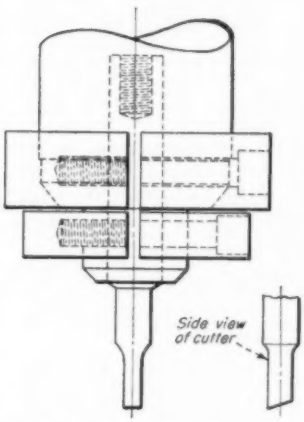
Pivot Pin Positions Round Work for Slotting

AN EASY WAY to mill two slots diametrically opposite each other on a shaft is to start off by drilling and reaming a hole into the bottom of a V-block.

After the hole is finished, the V-block is clamped on a table, the work is located and clamped on the block, and one slot is milled. Then a pin is made to fit both the milled slot and drilled hole in the V-block, and this is assembled into the block. The work is turned over and clamped with the pin locating it exactly in the block.

The setup is quick, simple, and inexpensive. *Frank M. Butrick, Jr., Alma, Mich.*





Spindle Clamp Helps Miller Do Vertical Shaping

A NUMBER of milling machines now on the market, and many old ones, do not have positive spindle locks to keep the spindles from rotating. For jobs that require square corners, such as die-sinking and mold-forming, such a lock is useful for making a vertical shaper out of a vertical milling machine.

This spindle clamp, made from two split collars that are welded together, will fix the miller spindle so rotation cannot take place. Then, using hand feed and a proper cutting tool in the collet, the work can be cut to form corners, slots, and the like by simply moving it up against the toolbit. For angular work, the spindle of the machine must be swiveled.

Shaper clearances and other angles are necessary on the collet-held toolbit, and rigidity is important. *Miller Hough, Manchester, Conn.*

Radiused Pressure Pins Coin to Equalize Load

PRESSURE PINS with unequal lengths are a major cause of buckling in many blanking and dishing operations. Making the pins the same length does not always work because the cushion and ring may not be even. Radiusing the ends of the pins helps this condition somewhat.

The radius cut in the lower end of each pin should be the same as the cross-sectional radius of the pins. This provides a small area on the end of each pin, and allows the pins to flatten slightly, in various amounts, so they will even up.

As an example, suppose a job requires 3.5 tons of force. Without any deflection of the ring, the force might be held on only three pins, with five pins taking no load.

If the pins are radiused, the 1-ton load on each of the three lower pins would coin the ends of the pins, and after a few strokes they would be reduced in length so all eight pins would take the load evenly. *Sid Gilbert, Bridgeport, O.*

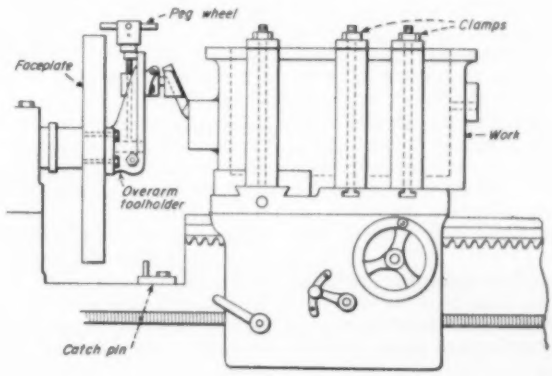
Turret Attachment on Engine Lathe Faces Off Large Work

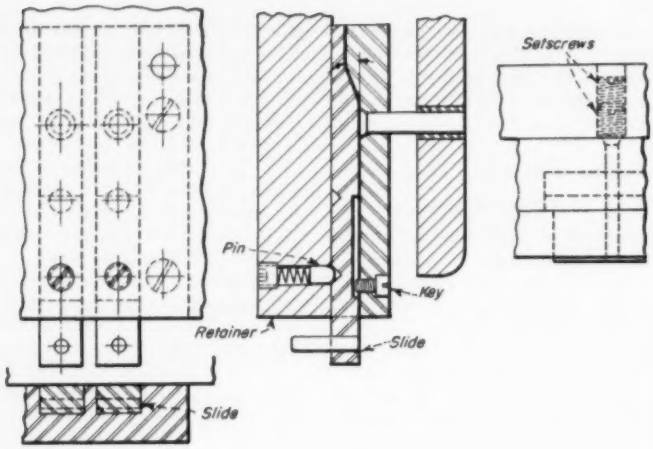
A STANDARD PIECE of turret equipment, the screw-operated overarm toolholder, can be fitted to an engine-lathe faceplate to mill extra-large work that is mounted on the saddle. The only modification is to add a peg wheel and a catch pin which will advance the tool each time the overarm rotates.

The overarm toolholder, which is simply a bracket that supports a toolholder in a slot, along which the holder is advanced by a screw, is bolted firmly to the faceplate of the lathe. Instead of the normal handwheel that advances the holder, a simple wheel with four round peg handles is installed on the screw.

The catch pin is located on the bed of the lathe. This is a vertical round pin, held in place with a bolted bracket. As the faceplate revolves once, the catch pin is hit by one of the pegs on the wheel, which revolves the wheel a quarter of a turn.

The work is secured to the lathe saddle, from which the cross-slide is first removed. Although the advance of the tool is sudden and might result in tool breakage, this danger is slight because the actual tool advance is quite slow. *Allan Clarke, Castleton, Lancs., England.*





Retractable Punches Work On Alternate Jobs

FOR INTERMITTENT punch-press operations, where two or more similar jobs are done from time to time on the same press, retractable punches allow a single die-set setup to be left on the press. The only changes in setup between jobs is releasing one set of punches and retracting another.

Here are two designs for the same idea. The one at the left is a heavy-duty job, while the one at the right is for light-gage stock only. The heavier punch plate is fitted with a slide that backs up one or more punches. In order to free one set of punches so they will be inoperative when the ram drops, the slide is pulled back, out of the punch retainer, until a plunger is pushed by a spring into a drill spot in the slide. To prevent the slide from coming all the way out, a key is inserted through the punch retainer to fit in a slot milled in the bottom of the slide. With the slide pulled out, the cut-away section of the slide rests over the punch, so the punch can ride up as the ram descends.

To activate alternate punches when the slide is pulled out, the slide must be slanted off and thickened where it will back up other punches.

A simpler arrangement for light stock at the right has only two setscrews jammed together backing up the punch. To make the punch inoperative, both screws are backed off. With this setup, heavy stock might strip the threads on both screws. *F. A. Adams, Dayton, Ohio.*

Left-Handed Drill Made By Adding Bar Handle

SOME JOBS require that work must be held under a drillpress with the right hand while the drill must be operated with the left. This is easiest if both the operator and the drillpress are left-handed, but for most cases a simple addition to the drillpress will make the job much easier. It takes only a little work and material to make a drillpress ambidextrous.

The left-hand end of the feed handle is usually threaded for a check nut and a return spring. An auxiliary handle, which is made by drilling and tapping a piece of bar stock and attaching a handle to a cross hole drilled in the other end of the bar, is assembled to this threaded end. A setscrew will keep the bar handle in proper location. *Bernard Levowich, Brookline, Mass.*

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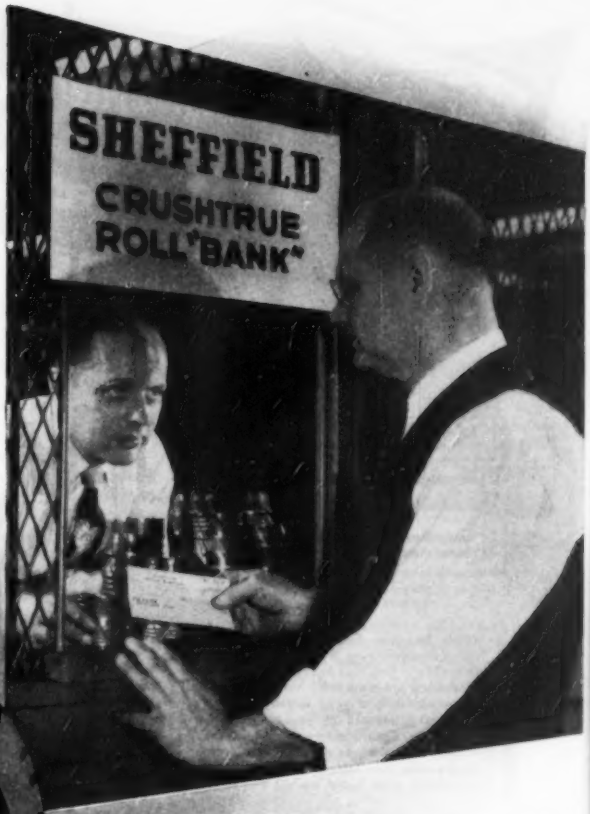

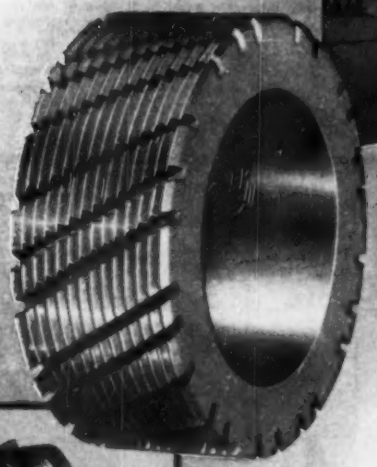

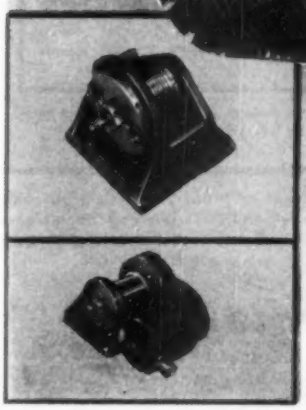

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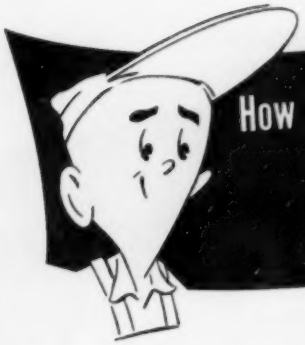
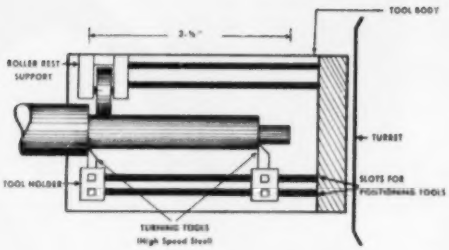
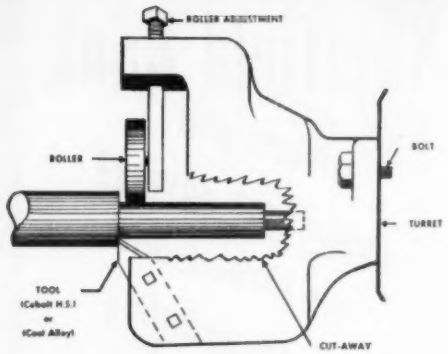


How 2 single-cutter box tools solved a problem ...by Stainless Sam



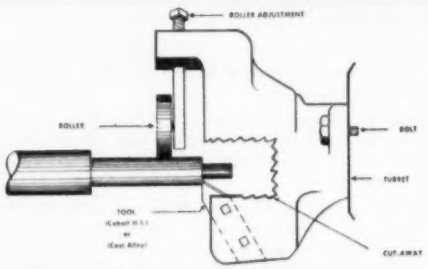
1 When Stainless Sam called on this machine shop, the operators were having a tough time with this job. They were running a ⅝"-diameter free-machining stainless steel bar on a turret lathe, using a two-cutter box type turning tool. Tool life was poor, and because of excessive overhang, surface finish was unsatisfactory.

Stainless Sam knew that by changing to two single-cutter box tools results could be improved, and *machining time could be cut too.*



2 He set up the first cut as shown in this sketch. The larger bit made it possible to use a 10% cobalt high speed or cast alloy tool, permitting an increase in feeds and speeds.

Since the job requires turning to only two shoulders, and one of the turned-down diameters is very short, the increase in feeds and speeds more than compensates for the time required to make the second cut.



3 Making the second cut this way decreases overhang and improves surface finish. Note that the roller-rest bears against the diameter turned in the first cut. This provides much greater assurance of accurate centering.

THIS WAS THE SCORE:

4

OLD METHOD—	
Speed: 70 SFM; Feed: .0075" per rev.	
Total machine time	68 seconds
NEW METHOD—	
Speed: 140 SFM; Feed: .010" per rev.	
First Cut	25 seconds
Indexing of Turret	5 seconds
Second Cut	7 seconds
Total machine time	37 seconds
MACHINE TIME SAVED	31 seconds

Oh yes, the problem of tool life and surface finish was solved too.

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REFERENCE BOOK SHEET

Pneumatic-Toggle Die Cushion

BY D. A. ROGERS, DAYTON ROGERS MANUFACTURING CO.

When a single-action press is used for deep-drawing operations, the manner in which pressure is applied to the blank holder or draw ring becomes important. The pneumatic-toggle die cushion sketched applies the greatest pressure at the start of the cycle. This condition is required in order to prevent wrinkles.

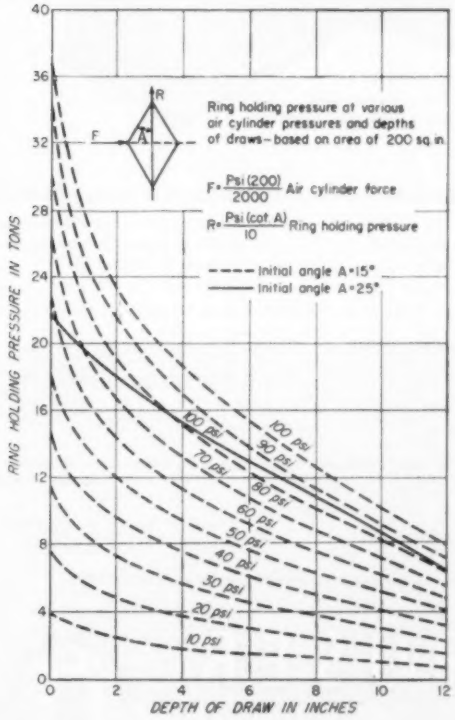
Other methods for draw-ring control are: (1) springs and rubber, which may build up the pressure to a prohibitive value at the bottom of the stroke, and (2) pneumatic die cushions. The latter tend to increase the pressure slightly, although it can be kept nearly constant with depth of stroke if a large surge tank is connected into the circuit.

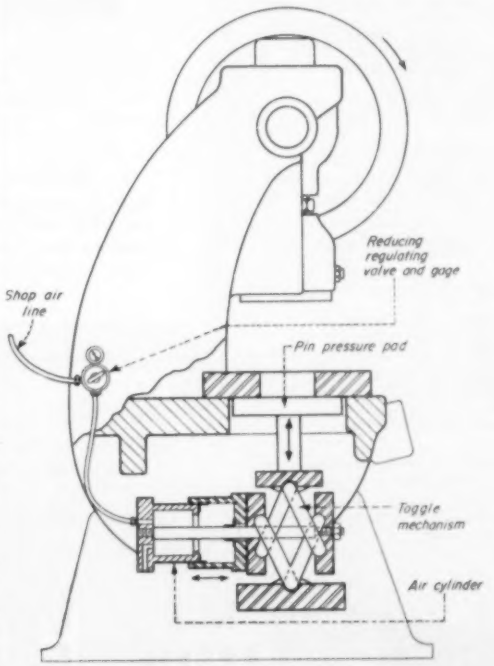
With the pneumatic-toggle die cushion, the pressure exerted on the pin-pressure pad unit by the toggle is a function of cot *A*. Thus, as the draw proceeds, angle *A* increases, the value of cot *A* decreases, and the ring-holding pressure drops off.

The accompanying curves are calculated on the basis of a 12-in. maximum depth of draw, toggle links 10 in. long, a 16-in. air cylinder, a piston area of 200 sq in., and various air pressures. It was assumed that the build up of pressure within the air cylinder at the end of a 12-in. draw would equal twice the starting pressure.

The combination reducing and regulating valve and pressure gage operates off the shop air line, and assures constant initial pressure on the pin-pressure pad at the beginning of the draw cycle. Furthermore, this valve compensates for probable air leakage in the cylinder. With the arrangement shown, the pressure builds up in the cylinder with press stroke, but if desired a surge tank can be used to keep nearly a constant pressure in the cylinder.

Air-controlled toggle cushion units can be built in sizes to provide ring-holding pressures of ½ to 100 tons, figured from the start of the drawing cycle. The unit can be fastened to the bolster plate on the average punch press, and can be dropped out of position by removing two suspension rods.


RING HOLDING PRESSURE IN TONS
DEPTH OF DRAW IN INCHES
Ring holding pressure at various air cylinder pressures and depths of draws—based on area of 200 sq. in.
F = Psi (200) / 2000 Air cylinder force
R = Psi (cot A) / 10 Ring holding pressure
Initial angle A=15°
Initial angle A=25°
100 psi
90 psi
80 psi
70 psi
60 psi
50 psi
40 psi
30 psi
20 psi
10 psi



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Milling Machines—Five different types, working surface of table ranging from 4-23/32" x 16½" to 10" x 43-5/16". In addition of spindle—All angles in all directions

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Working surface of table 29½ x 24½
Longitudinal travel of table slide 28"
Transverse travel of boring 20"
Vertical travel of boring spindle 7"
Maximum distance spindle to table 28½"
Maximum distance between columns 35½"
Diameter of circular table 20"
Diameter of tilting circular table 12¼"

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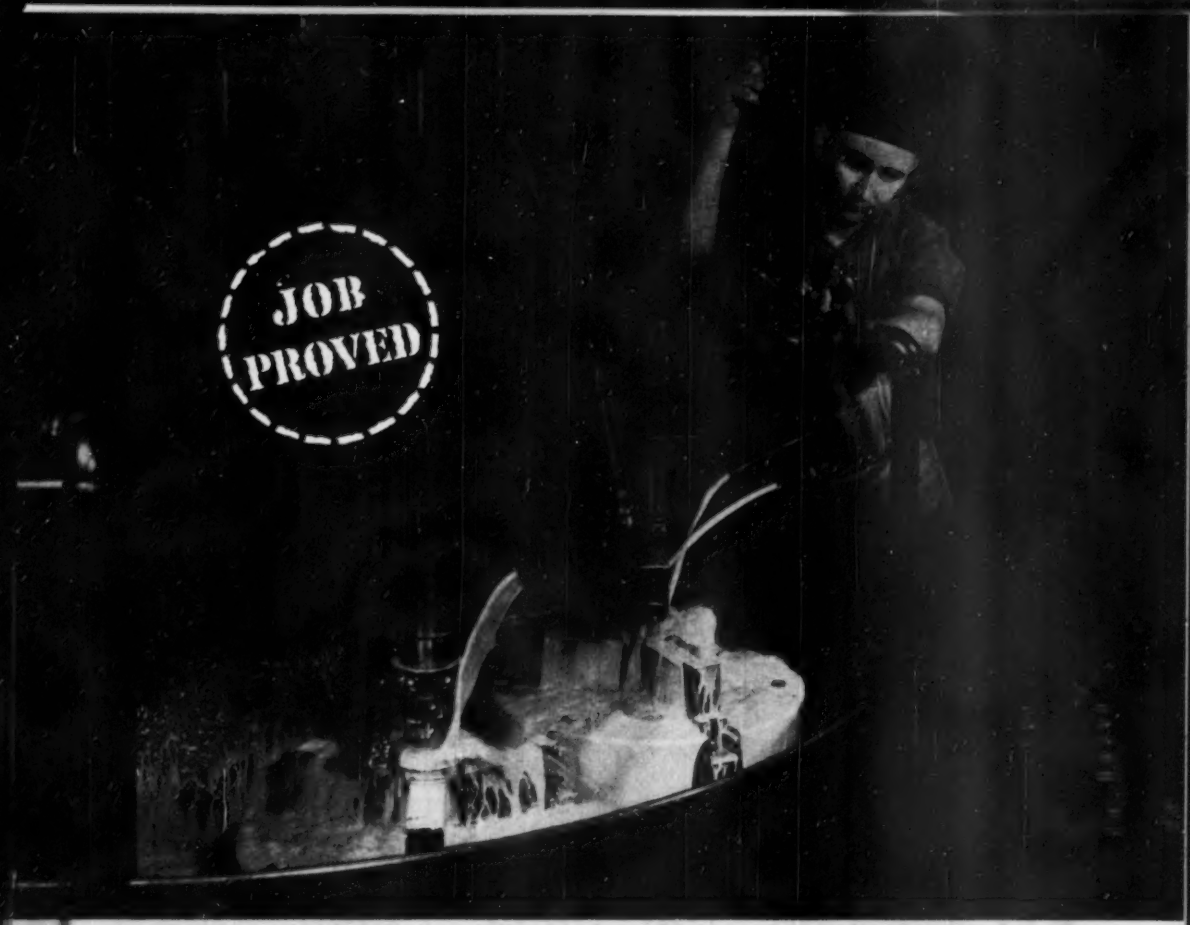
Hints for Welding Common Metals...I

COURTESY LINDE AIR PRODUCTS CO.

	GRAY CAST IRON	LOW-CARBON STEEL	HIGH-CARBON STEEL
PREHEATING	Cast iron must be preheated before welding. Small parts can be heated with a blowpipe flame. Large parts require a firebrick furnace.	Preheating is not necessary because of the strength and ductility of steel. However on heavier materials, preheating will help hold the welding heat.	Preheating is usually desirable in order to complete the weld as quickly as possible once it is started. Preheating will also help avoid expansion and contraction cracking, as well as cracking from rapid cooling.
FLAME ADJUSTMENT	Adjust the blowpipe for a neutral flame. Use a tip one size larger than for the same thickness of steel.	A neutral flame should be used for welding ordinary low-carbon steel. Other flame adjustments can be used to weld certain special steels.	The flame should have a strong excess of acetylene. An oxidizing flame, or even a neutral flame, tends to burn out the carbon in the steel and thus change its physical properties.
WELDING ROD	A cast iron rod, high in silicon and low in sulphur will give the best results. Certain elements in cast iron such as silicon, tend to burn out during welding. The rod should contain sufficient silicon to insure the proper amount of this element in the weld metal. OXWELD No. 9 Cast Iron Rod meets all these requirements.	The rod to use depends upon the physical properties desired in the finished weld. OXWELD No. 1 H.T. Rod will produce welds of good ductility with tensile strengths from 10 to 25 per cent higher than low-carbon steel base metal.	For thin sections a relatively low-carbon rod with certain alloy additions to increase strength can be used. OXWELD No. 32 C.M.S. Rod is in this class. For heavier sections or parts that are to be subsequently heat-treated OXWELD No. 6 Chrome Molybdenum Rod is recommended.
FLUX	A flux is needed in welding cast iron to float out the oxide coatings. When white specks appear in the puddle, it is a sign that more flux is required. These specks are oxides and if not removed will cause unmachinable hard spots in the weld.	Iron oxide readily floats to the surface of a steel weld since its melting point and specific gravity are considerably lower than those of molten steel. Therefore no flux is required.	No flux required.
PUDDLE	Molten cast iron is extremely fluid and tends to remain fluid for a long time. The experienced operator, however, has no difficulty in controlling it, and usually maintains a much larger puddle than with any other metal. Because it is so fluid, cast iron must be welded in the downhand position. It is difficult to weld vertically and overhead. Backing up the weld with carbon blocks or carbon paste will help make the job less difficult.	Fusion is confined to a small area directly under the flame. The metal is not very fluid until it is thoroughly molten—that is, there is a soft or "mushy" range between the solid state and the liquid state. This is of great value in controlling the puddle, especially when welding a vertical seam or welding directly overhead.	Use only just enough heat to obtain fusion between the rod metal and the base metal and thus avoid overheating the base metal. Bubbles rising in the puddle indicate the formation of carbon dioxide gas and are usually a signal that the flame needs adjustment. Be sure to work the bubbles out thoroughly as they will cause blowholes if they become entrapped.
MAKING THE WELD	Let the tip of the inner cone just touch the metal, moving it in a circular motion so that both sides of the vee and the welding rod will melt at the same time. Moving the blowpipe in this way will also help carry a good heat around the weld area. Do not stir the molten puddle with the welding rod and do not let the rod drip into the weld drop by drop. Once the weld is started, carry it through to completion as rapidly as possible. Do not rework the weld without adding rod.	Hold the blowpipe and rod at an angle of about 90 deg. to each other. Each will form an angle of 45 deg. with the surface of the work. The end of the inner cone should not quite touch the metal. Dip the end of the rod into the puddle, and let it rest on the bottom of the puddle area below the surface of the puddle. As the rod melts move it from side to side in the puddle.	The backhand technique of welding is usually preferred, using a minimum amount of heat. If the flame is withdrawn slowly after each pass, it will help to avoid blowholes. Finish the weld as quickly as possible and do not remelt or rework the weld metal if it can possibly be avoided.
TREATMENT AFTER WELDING	When welding is completed, reheat to a dull red, cover with asbestos paper, close the draft ports in the preheating furnace. Do not disturb until the casting is cold, or, if the casting is small, bury it in an annealing bin.	The small amount of oxide that forms during welding remains on the surface as a scale, and can be easily removed when cold. Heat treatment after welding is not required.	Most parts made of high-carbon steel have certain properties that were imparted to them by special heat-treatment. These properties are more or less altered in the neighborhood of the weld and additional heat-treatment is necessary to restore them.



S.E.C.O. BOOSTS PRODUCTION 22%

Sunoco Emulsifying Cutting Oil Ends Rusting, Decreases Downtime, Results in Big Savings

When an emulsifying cutting oil is unable to prevent excessive rusting on machined surfaces, that's bad. But if, in addition, it has an offensive odor, that's worse . . . especially if you have to change it twice a week and thoroughly clean the machines. Three years ago a large manufacturer of electrical products sought a solution to just such a problem. It occurred in his machining of cast iron end-bearing cages for induction motors.

His search ended when a Sun representative introduced him to Sunoco Emulsifying Cutting Oil. Not only has S.E.C.O. prevented the rusting condition, but also cutting fluid changes are now spaced six weeks apart. Translated into management language, the performance of S.E.C.O. has boosted production, curtailed costs, effected savings. By sharply decreasing downtime, it has increased output 22 percent. Savings on oil and maintenance costs are amounting to almost $5,000 a year. The manufacturer is so well satisfied with Sunoco Emulsifying Cutting Oil that he uses it now in every machine which requires a soluble oil.

In all machine shop operations, on both ferrous and nonferrous metals, you'll find Sunoco Emulsifying Cutting Oil and Sunicut straight cutting oils of real assistance. They help maintain production schedules, lengthen tool life, and keep operating costs down. For a free Sun cutting oil recommendation card, write Dept. AM-10.

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SUNOCO

Hints for Welding Common Metals...II

	WHITE METAL	BRAZE-WELDING	WROUGHT IRON	LEAD
PREHEATING	The part needs to be warmed with the blowpipe before welding.	Slight preheating is necessary but the temperature of the part need be raised only to a "black" heat.	Wrought iron, like low-carbon steel, does not need to be preheated before welding because of its strength and ductility.	Preheating is not necessary.
FLAME ADJUSTMENT	Adjust the blowpipe to a slightly excess acetylene flame. Use a small tip.	The flame should be adjusted for a slight excess of oxygen. To get the proper flame, first adjust to neutral and then reduce the amount of acetylene. Correct flame adjustment is important.	A neutral flame should be used.	Because of the low melting point of lead, only a small amount of heat is required. Use a tiny flame adjusted to contain a slight excess of acetylene.
WELDING ROD	Use a commercial white metal welding rod. This can be obtained from your local welding supply jobber. Remove oxide coating just before welding.	As the strength of a braze-welded joint depends directly upon the quality of the rod, it is important to use the best rod available.	Best results are obtained with a rod that has neither high-carbon nor high-alloy additions. OXWELD No. 1 H.T. Rod is ideal.	Welding rod may be made by cutting sheet lead into strips or by melting some lead and casting it into rods of convenient size. Always scrape the rod clean just before welding.
FLUX	No flux is needed.	A good flux is needed, to clean the surface of the base metal chemically. Dip the heated rod into the flux can often.	No flux is needed.	No flux is needed.
PUDDLE	The base metal will become mushy but not fluid. White metal has a low melting point and one must be careful to keep the heat low.	The base metal is not melted and the puddle contains only bronze rod metal. The base metal must be cleaned of grease, rust, and dirt to allow the puddle to spread smoothly over the surface. This is called tinning.	The puddle will be pasty rather than liquid. Will not flow readily. Avoid stirring the puddle with the rod.	Keep the puddle small. Lead has a low melting point and a large puddle can get out of control easily.
MAKING THE WELD	Remove oxide, plating, and dirt from the area to be welded. White metal melts at 800 deg. F. but oxide and plating melts at 2,100 deg. F. If you try to melt them the casting may collapse. Warm the part, then concentrate the flame on the surface of the break. When fine drops appear the casting is ready to weld. The metal will be mushy. Hold the blowpipe so the inner cone is about ½ to ¾-in. away from the metal. Add molten rod and build up the weld.	Heat the base metal only to a dark red. Apply a little fluxed rod. If the metal is clean and at the proper temperature, the rod will tin easily. If the metal is too hot the molten rod metal will bubble. If the metal is too cool the molten rod metal will ball up and won't spread. Keep the end of the rod in the puddle when you add rod.	Because of its high melting point, about 2,750 deg. F. wrought iron requires much heat. As the metal is heated, the slag in the iron will melt first to give the surface a greasy appearance. Continue to heat until the base metal really begins to melt.	Hold the flame almost perpendicular to the surface of the metal. The inner cone should almost touch the metal. Heat the lead until it just begins to melt, then add a drop of metal from the rod. Add the rod, a drop at a time, across the joint.
TREATMENT AFTER WELDING	None needed.	Cover the finished job with asbestos to keep off drafts of cool air.	None needed.	None needed.

Get "Squared Away" on Shearing Costs

...get SIMONDS "TUNGSWELD" Squaring Shears

(with the High Speed Steel Cutting Edge)

For longest cutting life between grinds, Simonds developed the "Tungsweld" method of welding High Speed Steel inlays to the tough steel backing of these Squaring Shears. This permits heat-treating *after* welding . . . assures full cutting hardness of the steel inlay, with longer cutting life.

For easier cutting, clearance is ground in the face and top edge . . . with accuracy and uniformity assured by special heavy grinders. The net result is a single-edge shear that outlasts other types . . . costs you less in down time and lost production . . . and gives the utmost in clean, fast shearing of tin plate, silicon, Monel, stainless or other thin sheet metal. Order from your local SIMONDS Industrial Supply Distributor.

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TALKING SHOP

Stresser

STRESS CONCENTRATION should be a primary study for inspectors from the armed services—or for their bosses. One maker of landing-gear forgings tells how closely service inspectors checked every forging to see that radii were maintained and that all surface nicks, scratches, or flaws were smoothed out. There was to be no chance for a stress concentration there—no siree! Then when the part passed, the inspector signified its acceptance by stamping it indelibly —with steel stamps. In several cases, the chief inspector, feeling stamp marks were not legible enough, ordered them stamped deeper. Of course, there were failures in service—right at the stamp marks. The forging maker watched one such case happen when the arresting hook on a plane snapped off cleanly as it caught. The hook went several hundred feet into the sea and the plane piled up. But sticking out of the wreck was the end of the arresting hook—showing the holes where a nameplate had been attached, right at the point of greatest stress.

An instrument maker also tells of a scribing instrument for lens reticles, made to tolerances unbelievably close. When it was finished and passed inspection, the inspector had his hammer raised to stamp the base when the maker caught his arm. The indignant inspector insisted that, unless stamped, the instrument would be rejected. Threats of bodily injury held him off until a phone call to Washington permitted a shift to less-enjoyable painted numbers.

Hammermen

WHICH FORGING METHOD is preferable, press or hammer? You can get as many advocates of either side as you find men. But one point made recently by a non-partisan is worth recording. He says pressmen are relatively easy to train, but he's lucky if he gets one good hammerman from 50 trainees. He feels that it's still worth it, because a good hammerman can work miracles with steel.

Million Hats

"AN OPERATOR may admire the modern appearance of a machine tool, but he isn't willing to 'break his back' 8 hr a day for that appearance. Designers of household appliances may crowd their mechanisms into inaccessible corners to get a smart outer form, and automobile designers may crush a million hats to get that 'fast-back' line, but in machine tools, function is vital, and sound engineering principles are not made to yield to esthetics."—*Frank Burgess and Harold Sizer, Brown & Sharpe, at ASME Fall Meeting.*

Gloves Rebuilt

THE GLOVES HAVE IT. Provided a plant does not buy too cheaply and does not require workers actually to wear out gloves, the practice of sending out work gloves for cleaning and repair pays handsomely. Twenty-six GM divisions sent out over 1¼ million gloves to a Michigan firm for this purpose; better than 83% were returned in cleaned, repaired condition. The year's salvage at value of 33¢ per pair was $¼ million.

Vital Carelessness

THE PROCESS of refrigerating dural rivets to delay carbon precipitation is supposed to have resulted from a worker's mistake in leaving a tray of newly heat-treated rivets outside the window on a sub-freezing Buffalo night, and another worker's mistake in letting them get on the production line in the morning . . . Now we hear that the process of cold-rolling steel was discovered when a careless workman let a pair of tongs go through a rolling mill. They came out shiny and smooth . . . Sometimes carelessness pays off—but not often.

Gas Coolants

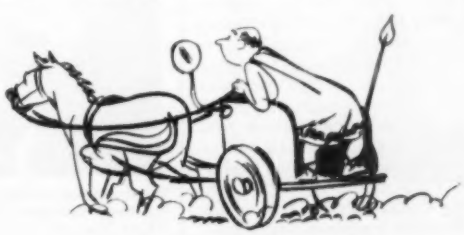
TESTS of liquid CO_2 as a coolant in metal cutting (*AM*, Aug. 7) are being continued by one automotive manufacturer. Evaporation of the liquid to a gas apparently cools both chips and tool and is claimed to reduce friction between them. Another company is using a blast of cold air for the same purpose. Shop air at 80 to 100 psi is passed through a copper coil within a box cooled by solid CO_2. The cooled blast is blown across the face of the tool, and is reported to keep work, chips and tool at room temperature.

Daffynitions

LIBERTY: what many people want until they find out it means responsibility. RUSSIAN WORKER: labor slaving device. MODERN HOUSE: a switch regulates everything but the children. LIQUIDATE: soda-parlor romance. DEBTS: certain outcome of uncertain income. LOCAL GOSSIP: gadvertiser. WALKING: locomotion from house to garage. CAREER GIRL: all work and no playboy. COMIC STRIPS: most people on a beach. EVENING DRESS: more gone than gown. HORSE SENSE: ability to "nay." JET FIGHTER: one you hear coming after it's gone. BOILING TEMPER: fast way to cook your goose.

Peek Behind

REAR-VIEW MIRRORS are at least 2000 years old. Early Britons put them on chariots that long ago, to prevent attack from behind. They were made of polished iron. Metalworking has since lost the business.



News of Metalworking

Industrial Notes ...

NEW MEASUREMENTS LAB — General Electric Co. has opened a new measurements laboratory at Lynn, Mass., with complete facilities for applied research, product development and design. H. E. Strang, manager, G-E Meter & Instruments Div., predicted in dedicatory remarks that the total value of measuring apparatus produced annually will rise from $600 million to more than $1 billion in the next decade.

LOCOMOTIVE DIV. SOLD—H. K. Porter Co., Inc., Pittsburgh, has sold its locomotive business, including patterns, drawings, and spare parts business to Davenport-Besler Corp. (Davenport Locomotive Works), Davenport, Iowa. Porter's Quimby Pump Div. has been sold to Warren Steam Pump Co., Inc.

AUTO PARTS FIRMS JOIN — Thompson Products, Inc., Cleveland, and Perfect Circle Corp., Hagerstown, Ind., have merged. The latter's stockholders will receive one share of Thompson common stock for each 4½ shares of Perfect Circle common. Perfect Circle's present management will continue, and sales and merchandising policies will be unaffected.

NEW SALES ARRANGEMENT — Pratt & Whitney Div. of Niles-Bement-Pond Co., West Hartford, Conn., will handle sales of Steinle Machine Co.'s centerless thread rolling machines.

NEW NPA ORDER—NPA's order limiting use of columbium alloyed steel to priority contracts only has been announced. It prohibits use of steel alloyed with columbium and tantalum for anything but DO-rated contracts.

TO INSTALL PLANT — Robert Talmadge of New Canaan, Conn., is now in northern France to install a powder metal parts production plant of his own design. ECA-sponsored, the plant is a complete unit including mixing, pressing, sintering, finishing and testing equipment. Parts produced will be used by the clock, bicycle, automobile, and business machines industries.

Impact of Defense Production Not Yet Felt by Machine Tool Industry

TORONTO—The machine tool industry should devote much time to telling its story to high government officials in Washington.

- Attention should be given to getting the defense job done as quickly and efficiently as possible.
- The industry should continue its campaign for replacement and modernization and for other long-term objectives, such as speedier depreciation of new equipment for tax purposes.
- There should be no relaxation in the industry's sales and promotion efforts, which will be especially essential after the defense program is completed.

These were some of the important themes discussed at the 49th annual meeting of the National Machine Tool Builders' Association at the Royal York Hotel October 11-13. Group meetings were held, as usual, in addition to the general sessions. Leonard W. Brockington, famed Canadian lawyer, addressed the dinner meeting on October 12.

- **Direct impact of military** production has as yet barely touched the machine tool industry, David Ayr, president, Hendey Machine Co., said in his presidential message. "That impact will come on top of our present still-growing volume."

Machine tool orders received since Korea represent, in part at least, a payoff on the industry's sales campaign of the last few years, according to Mr. Ayr. "We have been pounding away on the soundness and necessity of modernization from standpoint of increasing return on invested capital."

Mr. Ayr emphasized the importance of bringing America's metalworking plants up to a high level of efficiency for the sake of our ability to defend ourselves. He said, "We should continue to hammer away at our long-term sales philosophy of replacement as a means of obtaining a higher yield on invested capital, at the same time furthering our preparedness for the possibility of total war."

The industry likewise should continue to hammer away for more liberal depreciation allowances on capital goods, Mr. Ayr stated.

Instead of griping to Washington about why things can't be done, the machine tool industry should help make clear to people there how things can be done in the right way, Mr. Ayr said. "It is our job to help various people gain a true understanding of the time factor and other factors involved in increasing output above present levels."

- **"Our big job today** is in Washington," asserted Mr. Ayr, who outlined the stand taken by the industry in opposition to shipment of machine tools from England and other European countries to Russia and her satellites.

The Truman administration is more interested in the November 7 election and in advancing state socialism than in the nation's defense, charged Lloyd D. McDonald, executive vice president, Warner & Swasey Co., and chairman of the government relations committee. He commented, "politics remains the prime consideration, with the country paying the price in inflation, confusion, and unpreparedness."

Congress passed a law which tied wages and prices together, much to the discomfort of the White House, Mr. McDonald said. The Administration does not want wage controls until after the election. Thus it is letting matters slide, "hoping against

NEW HEAD of NMTBA is Richard E. LeBlond, president, R. K. LeBlond Machine Tool Co.

hope that inflation will not get too bad" until November 7.

Mr. McDonald revealed that military production probably will take 30% of steel output. Railroad freight cars will have first claim, lockers for soldiers second claim, and bins to store excess grain third. "So machine tool builders are left out in the cold, scrapping with all of the rest of the industries in this country for the remaining 70%."

• **Machine tool builders** should be subject to renegotiation only on that portion of their production which applies to the defense effort, Mr. McDonald asserted. This is the portion of the purchase price that covers its use during the emergency period.

Some of the people in Congress now understand that to estimate the so-called war profits of the machine tool industry, it is necessary to include not only the war years, but the years thereafter during which the industry suffers from second hand government sales of the machines built during the war.

• **New facilities** cannot be written off in less than five years, even though the emergency should be of shorter duration, Mr. McDonald declared, in discussing the new emergency facility amortization law. As soon as a certification agency is named, any machine tool builder who has expanded his plants since January 1, 1950, should file application for special amortization.

Today a Machine Tool Advisory Committee is in the making which will function as an aid to the National Production Authority, Mr. McDonald said. First meeting was on October 27. It soon will present the industry's problem to NPA's Steel Advisory Committee.

There should be no prohibition of exports of machine tools from this country to ECA nations, Mr. McDonald stressed. That would be a slap in the face to the countries we hope will stand with us in event of further Russian aggression.

"Do not let up on the propaganda for a sound modernization policy," was the advice of Swan E. Bergstrom, vice president, Cincinnati Milling Machine Co., in making his report as chairman of the sales and service committee.

• **"Our selling organizations** should not forget that the need for selling is just as important today as it was yesterday, and will be in the future."

Mr. Bergstrom said that "if it is sound for management to adopt a long-range policy of reappraising productive equipment constantly, then it is equally sound for machine tool builders to train salesmen now for the situation we know we will face when the defense program comes to an end."

Through sales training courses given the past three summers jointly by NMTBA and American Machine Tool Distributors Association, 621 men out of a total selling staff of 3250 in the entire industry have been trained. Mr. Bergstrom advocated continuation of these training courses permanently.

German machine tool builders will provide stiff competition for U. S. builders in the years ahead, according to Milburn A. Hollengreen, president, Landis Tool Co., who recently visited European countries. The Germans have many newly-designed machines which they have not yet put on the market. They have no intention of trying to come into the U. S. market importantly until Germany negotiates a commercial treaty with this country.

Mr. Hollengreen described the new General Motors plant in Britain as "the last word" in up-to-date manufacturing techniques. The same kind of modernization program is likely to be carried out at Opel, GM's German subsidiary.

Italy is developing rapidly industrially, said Mr. Hollengreen. Fiat,

(*Continued on next page*)

Machine Tool Group Named To Consult with NPA

• **A special committee** to consult with Machinery Div. of NPA was appointed at meeting of Joint Industry Machine Tool Preparedness Reserve Group at Toronto, Oct. 10. H. L. Tigges, group chairman, presided. Merits of E-1-B in administering priorities (if necessary) were pointed out, minimum staff and paperwork in Washington being required. NPA expects shortly to name a machine tool consultant within its Machinery Div.

Frederick S. Blackall, jr., pres. & treas. Taft-Peirce Mfg. Co., was elected 1st v.p. of NMTBA

Swan E. Bergstrom, v.p. of Cincinnati Milling Machine Co., was elected 2nd v.p. and a director

Jerome A. Raterman, pres. Monarch Machine Tool Co., was re-elected treasurer

Edward W. Miller, pres., Fellows Gear Shaper Co., was elected a director

Francis J. Trecker, pres., Kearney & Trecker Corp., was elected a director

Machine Tool Builders' Meeting

(Continued from preceding page)

for example, is sending some products, including motors, all over the Continent. French progress, by contrast, is disappointing. Inquiry shows that the proposed machine tool factory in India to be built by the Swiss is actually to be a munitions-producing plant.

• **A "DO" rating** can be extended to a subcontractor on a defense project if a machine or small group of machines is holding up a big program, Tell Berna, general manager of the association, said in his report. It is not necessary, on the other hand, to accept a DO order which will completely disrupt a company's production schedules if the order calls for a machine not ordinarily built in its shop.

New electrical standards will be ready for machine tools if and when limitation orders come through, Mr. Berna reported.

Over 200 export licenses for machine tools are being held up, he said, some of them since January. No orders should be taken for Europe unless: (1) adequate credit is set up in this country; and (2) export license is granted in advance. Export licenses are becoming more difficult to get.

Continuance of the industry's sales courses, Mr. Berna declared, is insurance against lean years which may be ahead. The industry must continue vigorous selling.

The advertising committee of the association will concentrate on helping to persuade industry to adopt and use an enlightened and continuous equipment replacement policy, Frank Pensinger, advertising manager, Monarch Machine Tool Co., said in his report as committee chairman. This is being done coincident with organization of a Machine Tool Advertising Council.

Mr. Pensinger said that contact has been made with the person responsible for sales promotion in every member company. The committee recommends no standard approach, suggesting only that a certain amount of each company's sales promotion be devoted to the replacement theme.

Several regional meetings of the Advertising Council already have been held and others will be arranged, but on no set schedule, Mr. Pensinger declared. He indicated that it is "neither necessary nor desirable to hit the prospect over the head with the word 'replacement'. In fact, you can preach the gospel of replacement without mentioning the word. Case studies are good. Promotion which approaches the subject in terms of percentage of cost reduction or percent of return per year on investment is excellent."

One suggestion is that emphasis be shifted from replacement to modernization, in view of the war-production situation ahead, Mr. Pensinger reported. He said that men in the Advertising Council recommend that NMTBA develop a sales attack concentrated upon top policy-making executives.

The Marshall Plan has made impossible the conquest of western Europe by infiltration, Alexander S. Keller, former senior industry officer and executive officer of the ECA special mission to Netherlands, asserted. Mr. Keller formerly was vice president of Pratt & Whitney, Div. Niles-Bement-Pond Co. He believes that Russia made a great error by not joining the Marshall Plan and then sabotaging it.

ECA has been one of the best investments that American taxpayers ever have made, Mr. Keller said. He pointed out that the AMP (Additional Military Production) program has been dangerously slow in getting started. Some of our allies have made tooling proposals on which no action has been taken.

AMP needs streamlining as an organization, in Mr. Keller's opinion. The Netherlands is a very desirable spot for establishment of manufacturing plants by U. S. companies, Mr. Keller said.

To Buy Locomotives Here

BOGOTA (McGraw-Hill World News)—Six new diesel electric locomotives will be purchased by Ferrocarriles Nacionales for service on Ferrocarril del Pacifico, following negotiations in the U. S. with several manufacturers. Cost, estimated at $2.5 million, will be financed by an Export-Import Bank loan to Ferrocarriles Nacionales.

Latest Defense Awards: Ford's $35-Million Contract

AIR FORCE

Ford Motor Co., Dearborn, Mich., aircraft engines & spare parts, $35,099,690.

Allison Div., General Motors Corp., Indianapolis, additional J33 spare parts, $4,369,448.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., boost controls, $665,000; torque pressure indicators, $161,643.

Schwien Engrg. Co., Los Angeles, modification of government-owned gyros, $106,250.

Bell Aircraft Corp., Niagara Falls, N. Y., misc. assemblies, subassemblies & spare parts for H-12 & H-13 series aircraft, $425,000.

North American Aviation, Inc., Los Angeles, misc. assemblies, subassemblies, & spare parts for aircraft, $3,503,838.

Westholt Mfg. Co., Inc., Wichita, Kan., aerial delivery kits, jeep, $872,237.

New Products Mfg., Inc., Dayton, Ohio, night reconnaissance camera systems and spare parts, $295,878.

Steel Products Engrg. Co., Springfield, Ohio, hoist assemblies, electric bomb loading, $548,884.

Aluminum Co. of America, Washington, D. C., aluminum sheet, $231,341.

Reynolds Metals Co., Louisville, Ky., aluminum sheet, $193,057.

Kaiser Aluminum & Chemical Sales, Inc., Chicago, aluminum sheet, $215,676.

Cook Electric Co., Chicago, Cook wall type telephone distr. frame, $124,562.

Westinghouse Electric Corp., Dayton, Ohio, generators, $495,917.

Cornelius Co., Minneapolis, compressor assemblies, $137,500.

Firestone Tire & Rubber Co., Los Angeles, B-29 fuel tanks, $1,574,370.

Goodyear Tire & Rubber Co., Akron, Ohio, B-29 fuel tanks, $1,562,708.

New York Air Brake Co., New York, hydraulic pumps, $181,600.

U. S. Rubber Co., Mishawaka, Ind., B-29 fuel tanks, $1,501,815.

General Electric Co., West Lynn, Mass., indicators, tachometer, $179,663.

Electrical Engrg. & Mfg. Co., Los Angeles, cowl flap drive assemblies, wing flap motor assemblies, $151,219.

Sylvania Electric Products, Buffalo, N. Y., radio transmitters, power junction box, $2,473,200.

U. S. Gage Div., American Machine & Metals, Inc., Sellersville, Pa., transmitter, torque pressure, $103,517.

Sperry Gyroscope Co., Sperry Corp., Great Neck, Long Island, N.Y., generators, $149,716.

Continental Motors Corp., Muskegon, Mich., spare parts for engines used in L-19 aircraft, $150,000.

Wright-Aeronautical Corp., Curtiss-Wright Corp., Wood-Ridge, N.J., spare parts for aircraft engines, $3,246,809.

Connecticut Telephone & Electric Corp., Meriden, Conn., telephone central centers, $1,200,000.

ARMY

Radio Corp of America, RCA Victor Div., Camden, N. J., radio sets, $1,430,000.

Plastic Wire & Cable Corp., Jewett City, Conn., wire WD-1, $1,778,476.

The Okonite Co., Passaic, N.J., wire WD-1, $1,036,813.

Rhode Island Insulated Wire Co., Inc., Cranston, R.I., wire WD-1, $383,422.

General Insulated Wire Works, Inc., Providence, R.I., wire WD-1, $798,832.

Plastoid Corp., New York, wire WD-1, $926,693.

Whitney Blake Co., New Haven, Conn., wire WD-1, $842,929.

Munston Mfg. & Service, Inc., New York, tube socket adapter kits, $141,329.

Brunner-Ritter, Inc., Bridgeport, Conn., hammers (carbine), $365,000.

M. S. Little Mfg. Co., Hartford, Conn., magazine assembly, $416,250.

Talon, Inc., Meadville, Pa., aluminum slide fasteners, $2,670,000.

Automatic Machine Prod. Co., Attleboro, Mass., components for delay element, M1 and M2, $121,397.

Midvale Co., Nicetown, Philadelphia, forgings, tube alloy steel, 90mm gun, $504,000.

Bethlehem Steel Co., Bethlehem, Pa., forgings, tube, alloy steel, 90mm gun, $271,875.

A. B. Steel Equipment Co., New York, work tables, $406,661.

DO Orders Can't Hog All the Steel

WASHINGTON — NPA's steel order — National Production Authority M-1 is a broad hint of the sort of thing you can expect to follow shortly in copper and aluminum, later in other nonferrous metals, raw materials, and even some components.

By setting percentage limits on the volume of DO orders any one supplier has to accept in any given month, NPA hopes to distribute the impact of mobilization equitably among suppliers and non-essential users alike.

The orders for steel and other metals are designed to give material suppliers assurance that their production won't be gobbled up 100% by DO orders—that disruption of their normal trade channels will be held to a minimum.

• **Here's how the steel order** is written:

If at any time a producer's DO orders for delivery in any particular month reach a certain percentage of his average monthly shipment during the January-August 1950 base period, the producer has the option of refusing to accept any more DO orders for delivery in that particular month.

Actual percentage limits vary according to what kind of steel you talk about. In the case of carbon semi-finished steel, carbon and alloy sheets and strip, carbon pipe, tin mill products, rail and track accessories, carbon wire rods, wire and wire products, the percentage limit is 5%; for carbon hot-rolled bars, carbon cold finished bars, carbon tubing, it's 10%; for carbon and alloy plates, carbon and alloy structural shapes and piling, alloy cold finished, bars, 15%; and for alloy semi-finished steel and hot rolled bars, alloy tubing, alloy wire and rods, it's 25%.

Producers can also refuse to accept DO orders when it would put monthly shipments (ingot tonnage figures) in excess of any month's scheduled production by 15% in the case of carbon steel, and 25% in the case of alloy steel.

• **Suppliers can also turn down** DO orders which call for delivery sooner than the buyer is going to need it, or if the order is placed less than 45 days prior to the month in which delivery is specified.

If turned down everywhere he tries, the buyer has recourse to the National Production Authority itself, which in special cases will give him a special DO order allowing him to place the order regardless of percentages.

GENERAL ELECTRIC Research Laboratory was located in a Schenectady barn in 1900. Today it occupies a 180-acre site at The Knolls, just outside the city. The new laboratory was dedicated Oct. 9 as GE marked the laboratory's 50th Anniversary. Offices of scientists in the main building, shown here, are set up in 12-ft modules. All services—water, electricity, gas, distilled water, compressed air, etc.—are supplied through vertical shafts readily available to each lab, and other vertical shafts may be opened to permit extension of any connection between floors. A machine shop, and shops for woodworking, glassblowing, welding, and electrical work, plus a small foundry, are fully equipped and manned to construct quickly special equipment needed by the scientists in their researches

for Aircraft Engines Is Biggest Job Announced

Wheeling Corrugating Co., Wheeling, W. Va., tent stoves, $977,239.

Reed Research, Inc., Washington, DC, portable gasoline pumps, $222,073.

Geuder, Paeschke & Frey Co., Milwaukee, 5-gal water cans, $398,726.

Nesco, Inc., Milwaukee, 5-gal water cans, $827,250.

Hotpoint, Inc., Chicago, 4kw griddles, $115,967.

Fargo Motor Corp., Detroit, automobiles, light, 5-passenger sedan, $1,304,484.

Chevrolet Motor Div., GMC, Detroit, trucks, ½ ton, 4x2 pickup, $7,437,093.

Austin Metal Prod., Inc., Detroit, frame, windshield, w/glass assembly, $477,750.

Mack Mfg. Corp., Plainfield, N.J., engine assembly, $491,568.

Watson Automotive Equipment Co., Washington, D.C., automobiles, ambulance, Metropolitan ¾ ton, 4x2, $153,463.

Federal Motor Truck Co., Detroit, shaft assembly, shaft, joint, collar, winch, yokes, etc., $105,875.

Ford Motor Co., Detroit, automobiles, 5-passenger sedan, $1,314,164.

Ward LaFrance Truck Corp., Elmira, N. Y., shock absorbers with lever link assembly, $102,156.

Electrical & Magneto Co., Tulsa, Okla., carburetor assembly, $275,320.

Troy Laundry Machine Div., American Machine & Metal, Inc., E. Moline, Ill., laundry, mobile, 2-trailor type, $2,941,617.

Crosley Div., Avco Mfg. Corp., Cincinnati, electric ranges, $129,529.

Florence Stove Co., Gardner, Mass., electric and gas ranges, $194,442.

Dispatch Oven Co., Minneapolis, bake ovens, $317,450.

Henry Products Co., Brooklyn, mast base, $246,173.

Olin Industries, Inc., Electrical Div., New Haven, Conn., batteries, $2,027,294.

Chatham Electronics Corp., Newark, N. J., tubes, electron, $155,925.

Tung-Sol Lamp Works, Newark, N. J., tubes, electron, $264,000.

Firestone Tire & Rubber Co., Akron, Ohio, 57mm rifle M18, $310,419; 75mm rifle M20, $359,468.

National Fore & Ord. Co., Irvine, Pa., forgings for 76mm gun T91, $390,000.

Struthers Wells Corp., Titusville, Pa., forgings for 76mm gun T91, $331,800.

Bell & Howell Co., Chicago, periscope T35, $100,000.

Sheldon Machine Co., Chicago, lathes, $109,100.

South Bend Lathe Works, South Bend, Ind., lathes, $203,368.

R. K. LeBlond Machine Tool Co., Cincinnati, lathes, $195,125.

C. H. Burns Machine Co., Chicago, lathes, $168,585.

Benrus Watch Co., Waterbury, Conn., plunger body assembly for delay plunger, M1, $598,601.

NAVY

Farrel-Birmingham Co., Inc., Ansonia, Conn., various repair parts for reduction gears, $111,608.

Madison Muffler Corp., Long Island City, N.Y., various repair parts for diesel engines, $227,931.

Cleveland Diesel Engine Div., General Motors Corp., Cleveland, various repair parts for diesel engines, $1,380,632.

Cleveland Steel Barrel Co., Cleveland, drums, steel cylindrical straight side, $140,240.

John A. Roebling's Sons Co., Trenton, N.J., wire rope, 6x19 galvanized, $142,506.

Ansonia Electrical Co., Ansonia, Conn., cable, $900,000.

Leece Neville Co., Cleveland, alternators and regulators for use on P4M-1 aircraft, $213,896.

Allison Steel Mfg. Co., Phoenix, Ariz., superstructure, parts, M4 bridge, $2,360,139; special tooling, $40,800.

JOINT

Ritter Co., Inc., Rochester, N.Y., dental operating units & operating chairs, $752,612.

S. S. White Dental Mfg. Co., Brooklyn, dental operating units & operating chairs, $193,781.

(By McGraw-Hill World News)

BRITAIN'S TOOL EXPORTS—The British government has finally put the lid on machine tool exports. It doesn't ban them, but it will put every shipment under closer scrutiny by requiring complete export licensing of all power-operated machine tools. Exports of machine tools to Russia for the eight months up to end-August were valued at £509,493, compared with only £111,775 and £43,007 for the comparable 1949 and 1948 periods.

NEW TRACTOR — Vickers-Armstrongs Ltd., England, is building a new heavy-duty crawler-type tractor aimed at supplying the sterling area and other markets with an earthmover tractor of a size never previously made outside the U.S. A production rate of 500 machines a year is planned ultimately, with first deliveries in January, 1952. The 32,500-lb tractor is powered by a Rolls-Royce 6-cylinder 4-cycle diesel engine, delivering 180 hp. Drawbar hp is 150.

CAPITAL EXPENDITURES CUT—Australia's metalworking and vehicle industries, which would have to bear the brunt of the contemplated rearmament program, are planning to tighten up on new capital expenditure. During the current half-year they may set a record of £15.3 million if original plans come off to schedule, but an amount of only £13.1 million has been earmarked by the engineering industries for expenditures on new plant and equipment in the first half of 1951.

NOVEMBER MEETINGS

Nov. 1-3—Industrial Management Society; Time & Motion Study Clinic; Sheraton Hotel, Chicago.

Nov. 1-3—American Society of Body Engineers, annual technical convention; Rackham Memorial Bldg., Detroit.

Nov. 2-3—Society for Advancement of Management, annual fall conference; Hotel Statler, New York.

Nov. 2-3—Society of Automotive Engineers, national diesel engine meeting; Hotel Knickerbocker, Chicago.

Nov. 8-11—Annual convention of manufacturers of Meehanite castings; Hotel Knickerbocker, Chicago.

Nov. 14-16—Machine Tool Conference, American Institute of Electrical Engineers; Sheraton Hotel, Worcester, Mass.

Nov. 26-Dec. 1—American Society of Mechanical Engineers, annual meeting; Hotel Statler, New York.

Nov. 27-Dec. 2—National Exposition of Power & Mechanical Engineering, ASME; Grand Central Palace, New York.

Industry Survey Will Determine Defense Role of Tool & Die Makers

CLEVELAND—The 450 members of the National Tool & Die Manufacturers Association, meeting here at the Hotel Statler for their fifth annual national convention as this issue of *AM* went to press, expected to hear from government representatives what is to be expected of the industry and the rearmament program, following a government study of the association's Mobilization Planning Survey.

The NTDMA mailed questionnaires to all tool and die shops of record in the country asking what services or products they specialized in, and what other products and services were made in the last war but not now.

Listed for owners' check were large, medium, small dies; progressive, laminated, carbide, forging, and die casting dies; plastic or permanent molds, jigs and fixtures, standard and special gages, tool engineering and design, cutting tools, Keller work, machining service, jig boring, engraving. Also amount of floor space now as compared to war time, and number of employees, broken down by shifts and trades or skills.

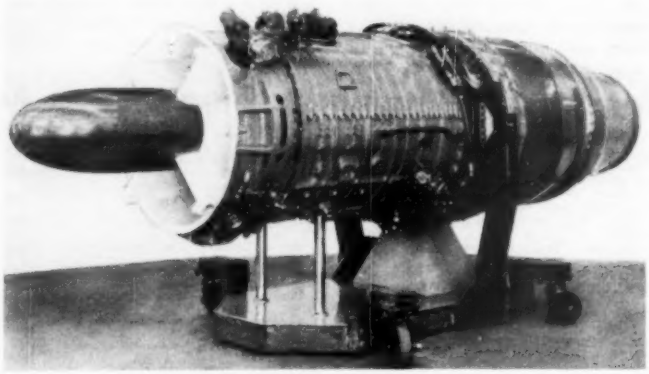
Some 2000 such questionnaires were mailed out. About 1500 replied. All replies were forwarded to Washington and made available to proper government agencies.

A report on this Mobilization Planning Survey was scheduled as one item on the convention agenda, which included also talks by Senator Robert A. Taft, speaking on "What About Small Business," and John Chapman, vice president and publisher, McGraw-Hill International Corp., telling of Russian industry and conditions behind the Iron Curtain.

Vision in Plastics Needed

SWAMPSCOTT, Mass.—Plastic materials have not taken their expected and rightful place as structural materials in industry because of a lack of imagination and courage to step into new fields on the part of their producers, it was suggested by Saul M. Silverstein, president, Rogers Corp., Manchester, Ohio.

In speaking at the annual meeting here of the Society of the Plastics Industry, he pointed out that mold sizes are limited by imagination more than by physical possibility; and that the industry's tendency to classify plastics as laminates or molded materials restricts development because these classifications are synthetic.



THE ARMSTRONG SIDDELAY SAPPHIRE, a 7200-lb static thrust turbo-jet aircraft engine. Wright-Aeronautical Corp., Wood-Ridge, N. J., recently entered a long-term agreement with Armstrong Siddelay Motors, Ltd., of Britain, to provide engineering and technical collaboration for the development and production of gas turbine engines of this and other types, including the Single Mamba turbo-prop of 1480 hp, the Double Mamba turbo-prop of 2870 hp, and the Python turbo-prop of 4550 hp. To the new partnership Armstrong Siddelay brings not only a 3-year headstart in gas turbine designing, but also England's largest testing station for engines and propellers at Ansty. The British company may also benefit from Curtiss-Wright propeller research in return

Edmond A. Neal

A. L. Carr

A. R. Kelso

Robert F. Golden

Names in the News

Edmond A. Neal has been named domestic sales manager, Nicholson File Co., Providence, R. I., assuming the duties of **Harry L. Whitney** who has resigned as director of sales. Mr. Neal joined Nicholson in 1939.

A. L. Carr has been named to succeed **J. C. Kuhn** as vice president and director of sales, Morse Twist Drill & Machine Co., New Bedford, Mass. Mr. Kuhn is retiring. **C. F. Myers,** formerly midwest district manager, has been named sales manager. **S. B. Lindh** continues as assistant sales manager.

Commander R. E. W. Harrison, USNR, has been called back to duty as staff officer in the Bureau of Ships, Navy Dept. He served in the Navy in World War II from 1940 to 1944, the first two years as machine tool contract officer, and the latter two years as a special assistant to then Under Secretary James V. Forrestal. Mr. Harrison's consulting engineering office in Chambersburg, Pa., will be closed after termination of all existing consulting obligations and contracts.

Mead L. Bricker, former vice president and Administration Committee member of Ford Motor Co., has been elected a director of Federal Machine & Welder Co., Warren, Ohio.

E. V. Crane has rejoined the engineering staff of E. W. Bliss Co., Canton, Ohio. With Bliss for 25 years, he left during the war to join Sam Tour & Co. as vice president in charge of mechanical engineering. Later he was chief engineer of Hydraulic Press Mfg. Co. **William G. McClain** has joined the Bliss Rolling Mill Div. as sales engineer, working out of Salem, Ohio.

A. R. Kelso has been elected vice president of Mack Trucks, Inc., New York, and vice president and director of Mack Mfg. Corp., manufacturing subsidiary. He will be in charge of manufacturing and production at all Mack plants, making his headquarters at Allentown, Pa. He joined Mack early this year as production counselor.

James J. Hagan has been named assistant plant manager, Weston Electrical Instrument Corp., Newark, N. J. He joined the firm in 1942 as a time study engineer and three years later was made personnel director.

D. C. Wedlick has been named district sales engineer in the Muncie-Anderson, Ind., area for Michigan Tool Co., Detroit.

Emil Gross has been named chief engineer, Hydraulic Dept., Allis-Chalmers, Milwaukee. He succeeds **Col. Joseph J. Ring** who retired in 1949 because of his health. Other appointments: **Frank Jaski,** assistant chief engineer; **B. R. Nichols,** mechanical engineer; **Ralph W. Hawkins,** assistant mechanical engineer; **Paul D. Hess,** hydraulic engineer; **Arthur Bruss,** chief draftsman. Four newly named sales representatives to General Machinery Division offices are **Donald H. McIntosh** and **Kenneth V. Knudsen,** Chicago; **Delpherd H. Verhein,** Milwaukee; and **Daniel Boland,** Davenport, Iowa. **Joseph Varacalli** has been named dealer sales supervisor for Allis-Chalmers' Empire region, with headquarters in New York. He succeeds **J. R. Queen,** who resigned to join Columbia Machine & Engineering Co., Hamilton, Ohio.

Robert F. Golden has been named works manager and **C. A. Sellen** has been named assistant to the general manager, Reliance Div., Eaton Mfg. Co., Massillon, Ohio. Mr. Golden joined the Reliance Div. in 1946, devoting his time to development and research until this promotion. Previously he was assistant to the president of National Lock Washer Co., Newark, N. J. Mr. Sellen joined the firm in 1939 as chief metallurgist.

W. L. Hughes, Jr., formerly sales manager of Oliver H. Van Horn Co., New Orleans, has been named general manager of the firm's Houston store, succeeding **Paul H. Griner,** retired.

John E. Blomquist has been named industry manager, Industrial Parts Div., Reynolds Metals Co., Louisville, Ky. He joined Reynolds in 1940. Since Oct. 1946 he has been serving as division manager of the Philadelphia office.

OBITUARIES

A. Oakleigh Bush, chief sales engineer of the Abrasive Div., Norton Co., Worcester, Mass., died Sept. 2.

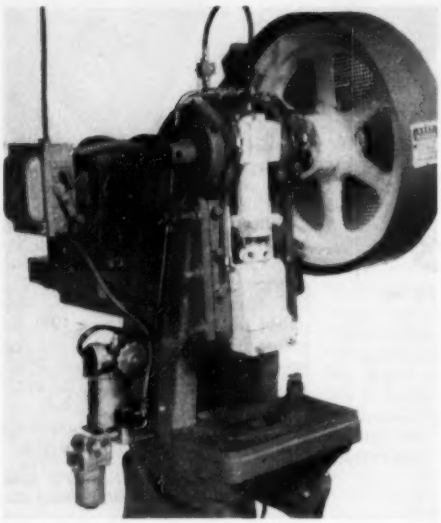
Earle S. Henningsen, 60, retiring manager of engineering of General Electric's Large Motor & Generator Divisions, Schenectady, N.Y., died Sept. 23. He was to retire Oct. 1.

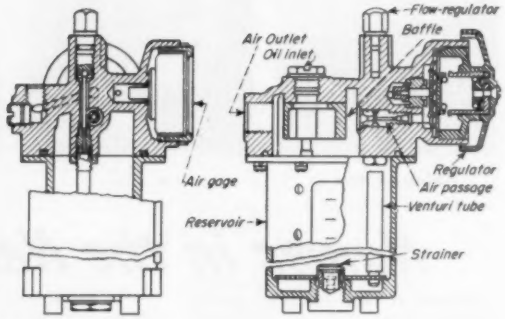
Arelin L. Wagoner, 65, who retired as purchasing agent of steel and steel products for General Electric Co. on April 1, died Sept. 28.

Ransford V. Mann, 62, vice president in charge of sales, Carpenter Steel Co., Reading, Pa., died Sept. 26.

Benjamin H. Jones, 61, vice president in charge of sales of National Screw & Mfg. Co., Cleveland, died Sept. 21.

New Shop Equipment





Lubricator for the system shown in end and side views. Its major function is to mix the oil with an air stream, the resulting mist passing out into the supply lines

System in operation on a punch press. It lubricates the slides and bearings automatically, using either the mist carried in the lines or droplets precipitated at the fitting

Oil Mist Cools, Automatically Lubricates

Alemite has developed a lubricating system which automatically delivers a constant stream of air-borne oil particles. Virtual elimination of the human factor in lubrication, drastic economy in lubricant consumption, and prolonged bearing life are among the claims made for the system, called Oil Mist.

Both coolant action and protection against dust and abrasives on bearing surfaces are said to be provided. The cooling action arises from two conditions. One is application of just the right amount of oil, reducing fluid friction. The second is the passage through the bearing of the air which delivers the mist. The pressure of the air carrying the mist is slightly greater than atmospheric pressure. Thus, by using a filter in the system, dust, abrasives, or other harmful matter are eliminated.

The system uses a water separator, solenoid air valve, a lubricator, tubing, and bearing connections. Air in the house air line is passed through the water separator and is then connected to the lubricator through an electric solenoid-operated valve, which is controlled by the machine power switch. This valve provides compressed air while the machine is in operation, making the system both continuous and automatic. The oil mist is conveyed through main lines to the tops of the machines where branch lines carry it to the bearings being served.

The heart of the system is the lubricator. Oil is poured through the inlet into the reservoir. Air then flows through the air regulator where it is reduced to the desired operating pressure, which is recorded on the air gage. Low-pressure air now flows through the passage, through the lubricator and out into the supply line. When the oil-flow regulator is opened oil is drawn up the Venturi tube, passing through a strainer. The oil then mixes with the air, the mixture blasting against a baffle which collects large droplets of oil and returns them to the reservoir. The mist then passes into the main supply line through the outlet.

The unit is built in two designs. One for use with air lines, while the other has a built-in air compressor. Two types of bearing fittings are available, one using mist directly, the other precipitating the mist into droplets by speeding it up and then allowing it to hit a baffle.

Alemite Division, Stewart-Warner Corp., Chicago, Ill.

(MORE DATA? CIRCLE FYI 31, p. 147)

Ethone Chemical Strips Plate from Copper Alloys

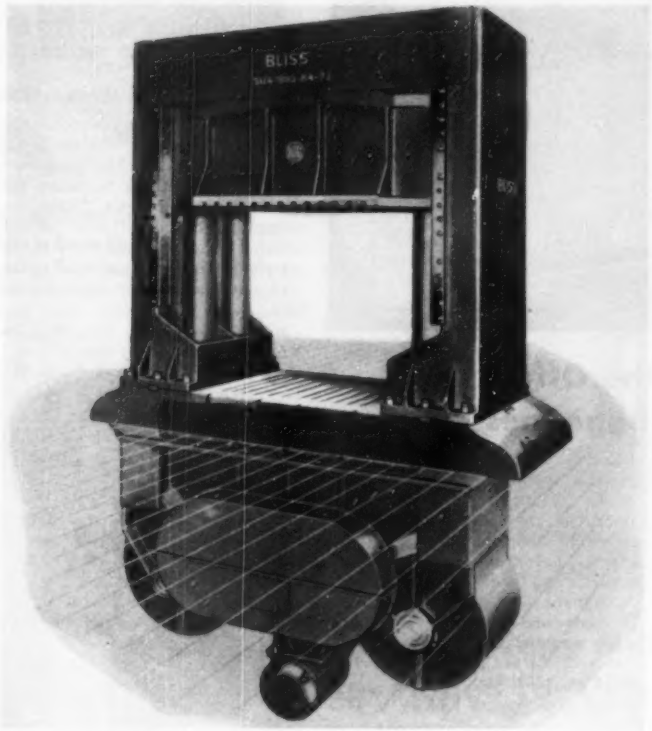
Ethone has developed a product for the rapid stripping of nickel, tin, lead, and chromium from copper, brass and other copper alloys without attack upon the base metal. The work to be stripped is immersed in an acid solution containing the chemical, called N-165, and rapid removal of the metal is accomplished. One pound is added to each gallon of acid solution—sulphuric being preferred in most cases. For nickel-chromium multiple coatings, hydrochloric acid must be used.

Process can be done at room temperature or at higher temperatures if faster operation is desired.

Enthone Inc., 44 Elm St., New Haven, Conn.

(MORE DATA? CIRCLE FYI 32, p. 147)

Materials and Parts



Shafts Are Easily Dropped In Bliss Under-Driven Presses

A line of 4-point under-driven eccentric presses has been announced by E. W. Bliss. Developed in close cooperation with leading auto builders, the design features easy accessibility of all parts, minimum service requirements, and heavy construction.

All bearings are arranged to permit the shafts to be dropped straight down, without the necessity of pulling. The presses are double-geared with the driving eccentrics cast integral with the main drive gears. All gears can be arranged to run in oil.

A single-disk pneumatic friction clutch is standard equipment. It does not require adjustment for wear and the friction plates are arranged for rapid heat dissipation. When worn out, the plates may be removed and replaced without disassembling the clutch. Side posts are fully skirted at the connection joint and are arranged with internal pre-shrunk tie rods which absorb the work load. The motor-driven slide-adjustment mechanism meshes with external threads on the top of the side posts, allowing extremely long adjustment by merely lengthening the threaded portion. Since the work load is carried entirely by the side posts, there is no need for tie rods in the frame of the press. 63 sizes are available, ranging from 300 to 3000 tons and with bed areas ranging from 72x48 to 300x108 in.

E. W. Bliss Co., 451 Amsterdam Ave., Detroit 2, Mich.

(MORE DATA? CIRCLE FYI 33, p. 147)

...INCLUDING

Toolroom lathe designed to provide increased power and accuracy .....page 140

Copy miller developed for dies up to 1100 lb. Has many attachments for tracing.....page 141

Porosity in small cast parts is defeated by high-pressure sealing equipment .....page 142

Driller for the machining of wire holes in hex-headed screws at high rate .....page 144

Metal-dust collector has a filter which can be cleaned and replaced after oiling.....page 146

Shaper has horizontal-feed motion motion arranged to give 4 variations per ram stroke....page 150

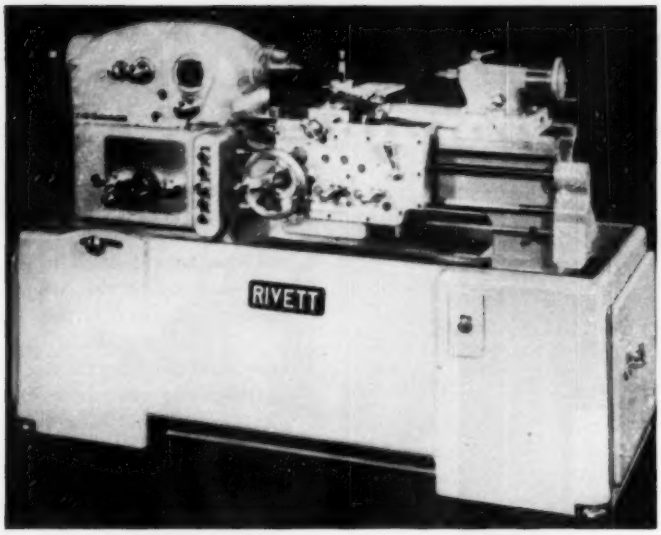
Stamping fixture permits the use of straight type for curved marking .....page 152

NEW BULLETINS for your Shop Library, including a 24-page catalog covering a precision jig borer .....pages 147 and 148

... and in November 13

Grinder designed for sharpening milling cutters and a variety of other tools has a simplicity of design that makes it easy to use.

Miller for toolroom work has a table and horizontal feed that will tilt to any desired angle.



Rivett Toolroom Lathe Offers Increased Power, Ruggedness

Recommended for both sensitive instrument work and heavy carbide cutting, the Model 1020 S has been constructed to handle any toolroom turning within its 12½-in. swing and 20-in. centers.

Contributing to its power are: 40% heavier weight of 4,000 lb.; headstock back gearing at speeds ranging from 22 to 400 rpm.; and a bed with 12¾-in.-wide steel ways uniformly hardened to 60 Rockwell C scale.

Precision features are: a three-bearing spindle mounting; a free spindle operating by direct belt drive, at speeds up to 3600 rpm.; collets mounting directly in spindle without adapter; hardened and ground feed-screws; and anti-friction bearings throughout. The gear box provides 72 feeds, and 84 threads including every world standard.

Rivett Lathe & Grinder, Inc., Brighton, 35, Boston, Mass.

(MORE DATA? CIRCLE FYI 34, p. 147)

Direct Readings Taken On Portable Hardness Tester

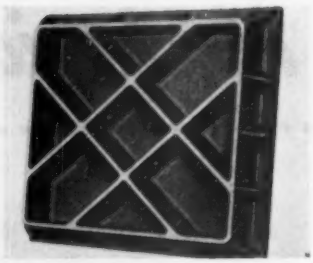
Direct and accurate reading can be taken on this portable hardness tester. It allows fast testing of repetitive or assembly line work by unskilled labor.

Hand grips on the side of the instrument are pressed downward to lower the indentor so that its point penetrates into the surface of the material under the action of a calibrated helical spring. The constant load exerted is 15½ lb. The movement is magnified about 3000 times by the method of displacing liquid from a container into a capillary tube. The tube is supported in a recess and encircles the scale so that the final position of the liquid indicates the hardness value directly.

The instrument can be used on curved as well as on flat surfaces, provided the radius of the curve is not less than 3/32 in. For convenience of use, the scale has been graduated to Brinell conversion figures. However, other scales may be supplied upon order. Performance is not affected by temperature variation.

Newage International, Inc., 521 Fifth Ave., New York, N. Y.

(MORE DATA? CIRCLE FYI 35, p. 147)

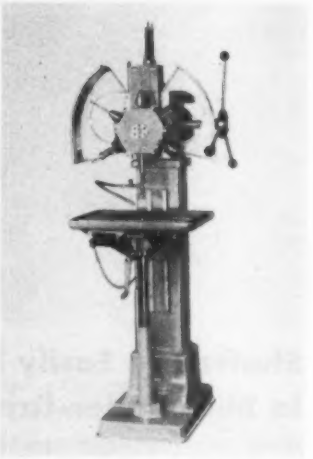


Delta Heavy-Ribbed Surface Plate

Delta points to these advantages for their surface plate: The surface is true to start with. The plate is a heavy ribbed casting to insure that the surface stays true. There is a clamping ledge on all four sides to which angle plates and vises can be attached. Edges are machined square with one another and with the surface.

Delta Power Tool Div., Rockwell Mfg. Co., Milwaukee 1, Wis.

(MORE DATA? CIRCLE FYI 36, p. 147)



Burgmaster Six-Spindle Driller Shields Operator While Indexing

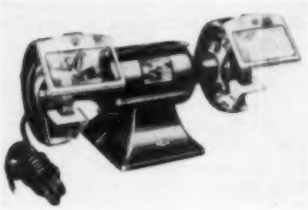
Improvements have been made in the Burgmaster, a six-spindle automatic indexing, drilling, and tapping machine. One is a safety shield which is mounted on the head casting, and protects the operator from the spindles during indexing. Another is a depth stop assembly which permits accurate depth control within limits of 0.001 in. This unit is easily adjusted and indexes automatically as the turret load indexes.

The ram-feeding unit has been changed such that it only has three spokes of convenient length to give

just the right amount of leverage. Positions of the handles can be adjusted to give the most comfortable working position.

Burg Tool Mfg. Co., Dept. AM., 3743 Durango Ave., Los Angeles 34, Calif.

(MORE DATA? CIRCLE FYI 37, p. 147)



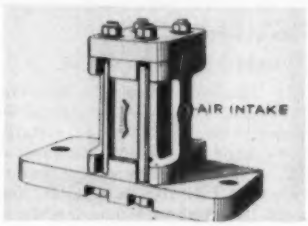
Shatter-Proof Safety Shields Put In Delta Grinder

One of the features of this 1/3-hp Delta grinder is the shatter-proof-glass safety shields that fit over the wheels. Other safety features are: A steel spark guard at the top of each wheel. Tool rests that always give full support to the work and are fully adjustable to any grinding angle. A three-wire cord that can be grounded.

The motor has sealed, lubricated-for-life ball bearings. The housing, end bells, wheel guards and base are heavy iron castings—this is said to contribute to stability.

Delta Power Tool Div., Rockwell Mfg. Co., Milwaukee 1, Wis.

(MORE DATA? CIRCLE FYI 38, p. 147)

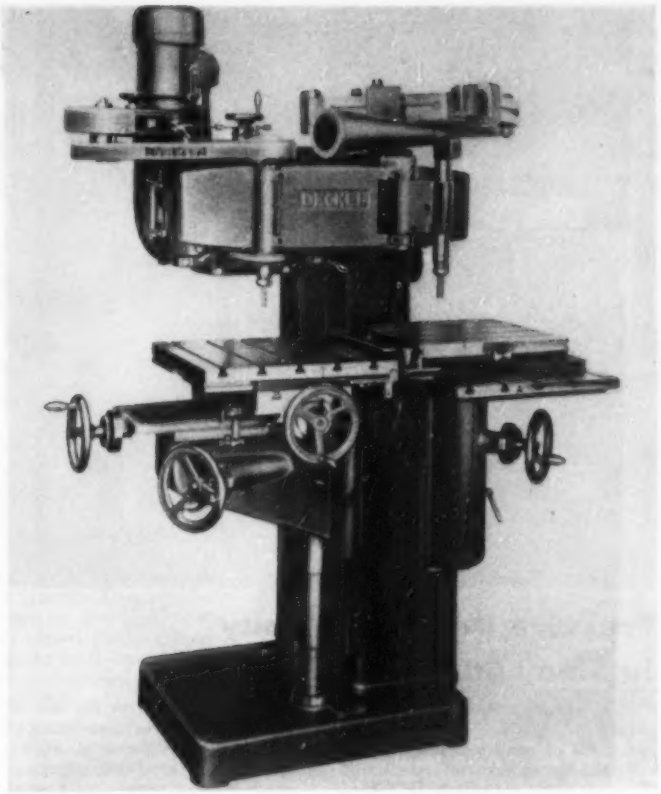


Vibrator Parts Reduced to 5 Major Components

Cleveland has simplified the design of its Type F unit so that the number of major parts has been reduced to five. The simplified design is said to have these advantages: maintenance is reduced to a minimum; wear is virtually eliminated; operation is easier. The parts are: mounting base plate, housing, spring, piston and head. Four bolts hold the assembly together.

The Cleveland Vibrator Co., 2752 Clinton Ave., Cleveland, Ohio

(MORE DATA? CIRCLE FYI 39, p. 147)



Universal Copy Milling Machine Developed for Dies Up to 1100 Lb

When copy milling at a 1:1 ratio on this machine, the pantograph serves only as a guide for the tracing stylus and cutter-head spindle. The parallel guiding device moves longitudinally, transversely, and vertically, and its weight is counter-balanced by an adjustable spring. Cutter-spindle speeds are stepless between 300 and 9500 rpm.

An optical contacting device indicates when the stylus touches the master, and is only used during rough-milling operations. A circular-milling attachment is used for milling radii and for making concave and convex patterns of geometrical circular forms. Another attachment is a line-milling device for rough and finish milling in longitudinal or transverse lines. A reduction and enlargement device has ratios from 1:1.5 to 1:7, and an adjustable clamping arm fixes the cutter spindle in various positions. The many attachments made for this machine are said to produce molds and dies with greater economy.

Cosa Corporation, 405 Lexington Ave., New York 17, N. Y.

(MORE DATA? CIRCLE FYI 40, p. 147)

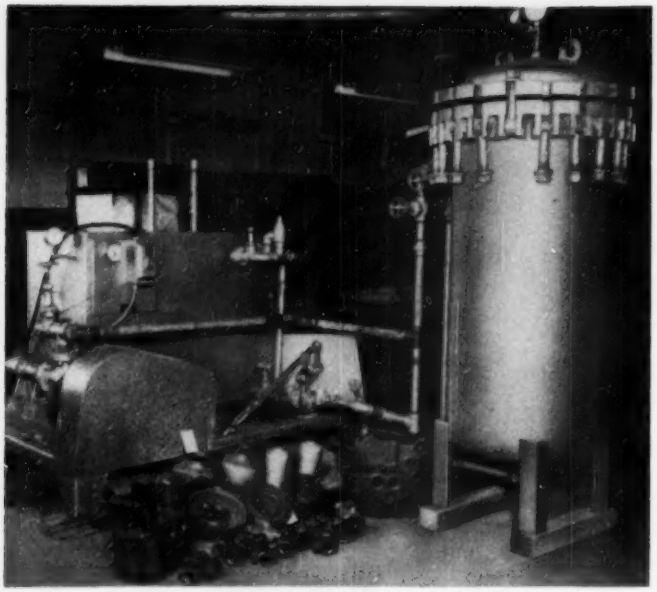
Extruded Zinc Anodes Do Away with Sludge

Extruded zinc anodes, either as cylinders for ball-anode containers, or in any desired length in elliptical form, are said to bring many advantages to users.

Corrosion characteristics are considerably improved and metal structure is more dense. They will not polarize excessively or produce sludge. Recommended for use in both cyanide and acid zinc solutions. They come either 99.9% pure or combined with aluminum.

Hanson-Van Winkle-Munning Company, Matawan, N. J.

(MORE DATA? CIRCLE FYI 41, p. 147)



Pressure Defeats Porosity In Small Cast Parts

Tincher high-pressure equipment permits a bulk porosity-elimination treatment of small cast parts.

Either before or after machining, the cast parts are placed in a wire basket which is lowered into the tank. When the cover is secured, the sealing agent used in the process is then forced into the tank. The high pressure created, forces the sealing agent into all pores and voids in the casting. No evidence of impregnation remains after the treatment —which does not require washing or curing.

Tincher Products Co., 861 Borden Ave., Sycamore, Ill.

(MORE DATA? CIRCLE FYI 42, p. 147)

Rush Wire Stripper Uses Friction-Generated Heat

The Rush wire stripper uses the principle of friction-generated heat to melt enamel and Formex-type insulations. Through proper selection of stripping wheels, many kinds of insulation can be cleanly removed without damage to the wire. The wheels may be resurfaced or dressed as they wear.

The model shown will strip wire gages 48 through 25, including Litz wire up to 50/44. Many models are made with a variety of special attachments and coil holders to fit the application. The strippers are available for outright purchase or may be had on a rental-test basis.

Rush Wire Stripper Div., The Eraser Co, Inc., 104 South State St., Syracuse 2, N. Y.

(MORE DATA? CIRCLE FYI 43, p. 147)

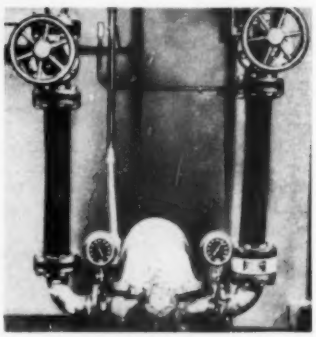
O-Ring Stops Dripping On Check Valve

These check valves utilize a synthetic-rubber O-ring between conical surfaces on the poppet and valve housing. As the line pressure works against the outer periphery of the O-ring, increased line presure increases the sealing pressure. The poppet load is carried by a metal shoulder in the valve housing. In the open position, the fluid flows around the poppet, giving the check valve good flow characteristics with low pressure drop. The spring retainer which serves as a poppet stop has ports to allow full flow even under surge conditions.

Opening pressures are as low as 1-psi differential in the standard-pressure types and 4-in. water column in the low-pressure models. Poppets close at zero flow before return flow starts. Using the same materials throughout eliminates electrolytic action and different temperature-expansion coefficients.

James-Pond-Clark, Pasadena, Calif.

(MORE DATA? CIRCLE FYI 44, p. 147)



Flexible Rubber Pipe Absorbs Vibration in Lines

The damaging effects of pipe-line noise and vibration are sources of major difficulties in many installations handling liquids, compressed air, or gases. Continuous vibration results in fractures, loose joints and supports which add considerably to maintenance costs. A rubber pipe, called the Soundzorber, is used as a flexible connection between the pump and the pipe line, eliminating vibrations.

Standard flanges on each end of the pipe are imbedded in the rubber. The pipe is merely bolted onto the machine flange. No gaskets are necessary. It is designed for working presures up to 250 psi, with a 5-to-1 safety factor. Available for pipes from ½ to 14 in. in diameter. It will withstand temperatures up to 250 F without damage.

Finn & Co., 2850 Eighth Ave., New York 30, N. Y.

(MORE DATA? CIRCLE FYI 45, p. 147)

New Driving Power Behind

AMERICAN PHILLIPS SCREWS!

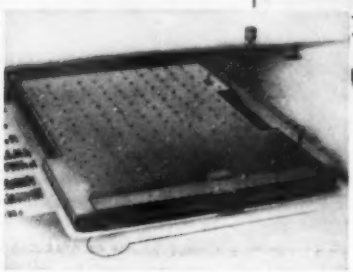
New Campaign Goes Direct to Retail Buyers of Phillips-fastened products

Manufacturers of all types of products know the production-savings and sales-promotion power of American Phillips Screws. And now 14,000,000 prospective *buyers of those products* are being introduced, through the Saturday Evening Post, to the dependable "buy sign" of the Phillips Crossed Recess (the recess with the wide center opening for easy driving). They are being told that:

- ✕ is a *Known Quality*... a mark of *Top Quality* throughout the product

This campaign puts greater sales drive than ever behind American Phillips Screws... another good reason why it's good business to Phillips-fasten *your* products.

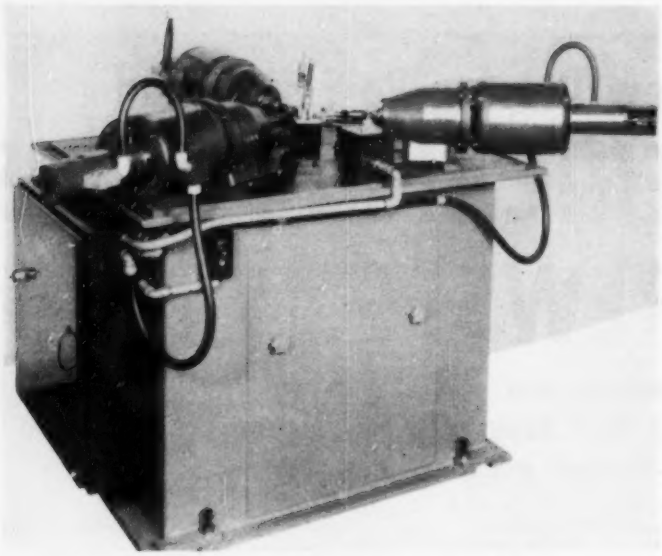
4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS



PHILLIPS HEADquarters is this new and modern 5-acre plant at Willimantic, Conn., where American is in stronger position than ever to supply the growing demand for Phillips fasteners.

AMERICAN SCREW COMPANY

Plants at:
WILLIMANTIC, CONN. and NORRISTOWN, PA.
Warehouses at:
589 E. ILLINOIS ST. CHICAGO 11
502 STEPHENSON BLDG. DETROIT 2

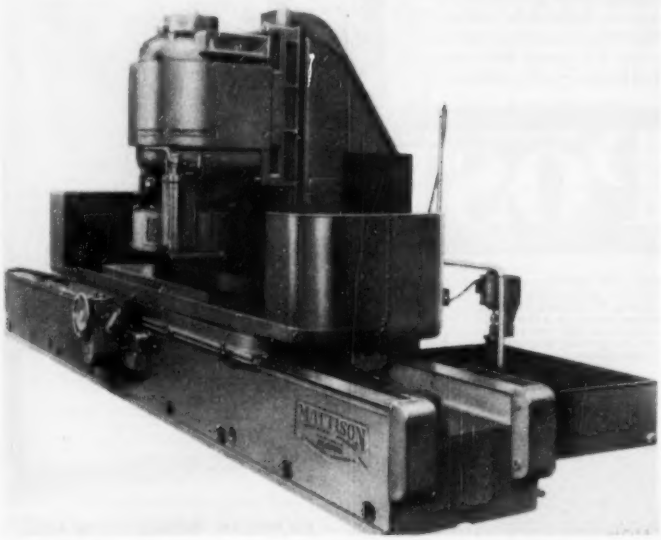


Machine Speeds Up the Drilling Of Wire Holes In Hex Heads

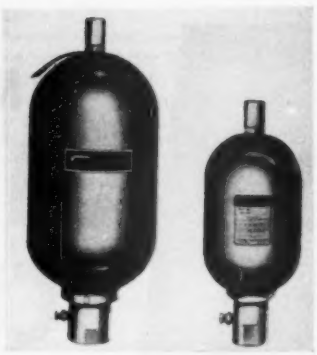
This machine employs 3 Model HH Govro-Nelson automatic - drilling units which drill three holes at once. The part is then turned and the three units are operated again to complete the six holes. Drilling six No. 51 wire holes in a cap screw with hardness of 25 Rockwell C, the machine showed a production rate of 288 pieces per hour, involving the drilling of 1728 holes.

Govro-Nelson Co., 1933 Antoinette, Detroit 8, Mich.

(MORE DATA? CIRCLE FYI 46, p. 147)



SURFACE GRINDER with vertical spindle is equipped with a 100-hp motor. The machine is in operation in one of the automotive plants reconditioning large-size dies. The motor is said to be the largest ever to be used in this connection.—*Mattison Machine Works, Rockford, Ill.* (MORE DATA? CIRCLE FYI 47, p. 147)

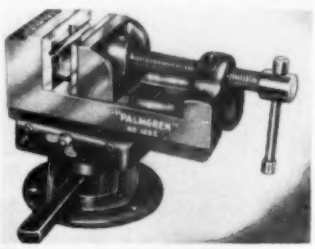


Vickers Accumulators Have Swaged Neck Connection

Designed to supplement operation of any Vickers vane or piston pump, these accumulators operate in circuits with intermittent high-pressure requirements. Unusually high-safety factor at 3000-psi pressure is said to be achieved by a swaged neck connection, and one-piece, seamless alloy-steel shell construction. The accumulators are available in five models with capacities ranging from 75 to 2050 cu. in.

Vickers Inc., 1410 Oakman Blvd., Detroit 32, Mich.

(MORE DATA? CIRCLE FYI 48, p. 147)



Palmgren Swivel-Base Vise For Bench and Drillpress Work

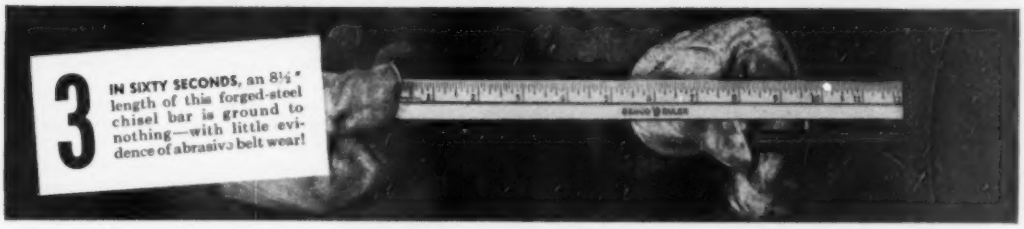
This vise can be rotated 360° horizontally and quickly locked in any position. The swivel bench base is bolted securely to a workbench for general shop work, but the vise may be easily removed for use on machines.

The base is dove-tailed and can be removed from the adapter by loosening the locking thumbscrew and sliding the vise out of the internally dovetailed adapter. A steel jib locks the vise with even surface pressure when a thumbscrew is tightened. Removable steel jaw plates are provided, one of which is V-grooved horizontally and vertically for holding round stock.

Chicago Tool & Engineering Co., 8383 South Chicago Ave., Chicago 17, Ill.

(MORE DATA? CIRCLE FYI 49, p. 147)

1
READY TO GO, this 12 inch forged-steel chisel, one-half inch in diameter, will be ground point first against a Grit 36 Three-M-ite Belt.


3
IN SIXTY SECONDS, an 8½" length of this forged-steel chisel bar is ground to nothing—with little evidence of abrasive belt wear!

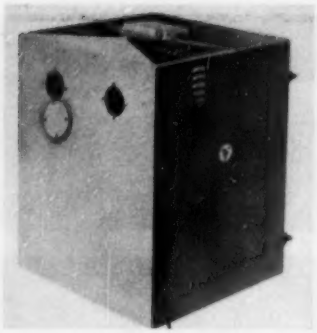
Only 3M Abrasive Belts give you grinding speed like this!

The 3M Abrasive Belt used in this dramatic test was driven at over 2 miles a minute, with complete safety. In just 60 seconds, a ½" diameter forged-steel chisel was ground from 12" long down to 3½"—total of 8½", with little evidence of abrasive belt wear.

What does this remarkable test mean to you? It means the 3M Method and 3M Abrasive Belts can cut your grinding time and abrasive cost. It means real abrasive stamina and quality—the kind you learn to expect when you specify 3M Abrasive Belts.

WE INVITE YOU TO USE OUR DEMONSTRATION ROOMS to work out faster and more economical grinding and finishing methods. A 3M Methods Engineer will show you how modern belt grinding equipment can cut costs. For the address of your nearest 3M Demonstration Room, write Dept. AM-105.

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Adhesives. General Export: Durex Abrasives Corp., New Rochelle, N.Y. • In Canada: Canadian Durex Abrasives Ltd., Brantford, Ontario.



Filter in Metal-Dust Collector Can Be Cleaned and Replaced

The openings on this portable dust collector are so located that it can be attached to all types of abrasive units. A squirrel-cage fan sucks both fine and coarse dust and small particles through an air filter. Larger particles fall into a pan at the bottom of the dust collector.

The filter is fireproof, has high filtering qualities, and is easily removed for cleaning. It need not be thrown away; when properly cleaned and oiled, it lasts indefinitely. The filter cabinet is of pressed steel. A large door in the back provides quick access to the filter; another, at the top, permits inspection of the motor.

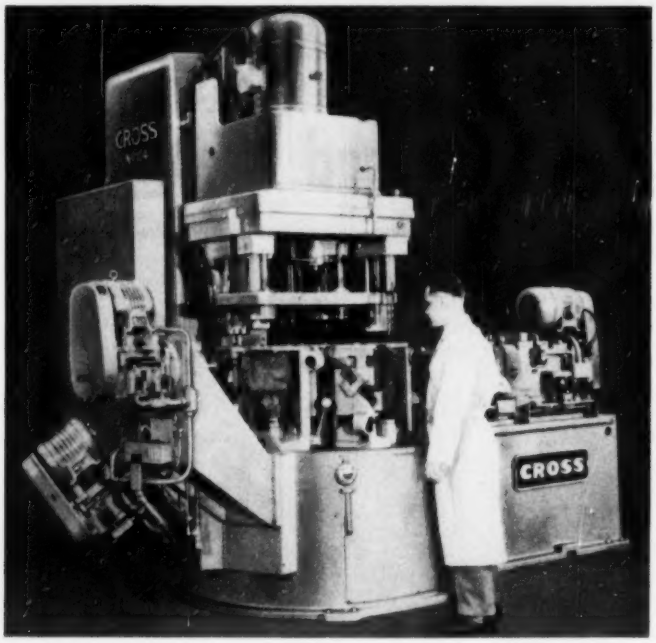
Delta Power Tool Division, Rockwell Mfg. Co., Milwaukee 1, Wis.
(MORE DATA? CIRCLE FYI 50, p. 147)

Miskella Blue Concentrate Cuts Rinse-Water Dryoff Time

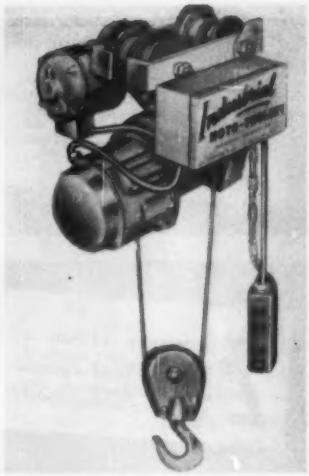
When used to replace ordinary water for rinsing metal and other solid materials, Miskella blue concentrate shortens the drying time and materially reduces the heat needed. Blowing off by compressed air is usually eliminated.

The concentrate, known as Dri-Water, can be used in connection with any infra-red oven. It may be sprayed, brushed, directed to the work by flo-coat or by needle-point showerbath technique. It will work on electroplated surfaces, hot parts, and in painting setups. The solution is made by adding one ounce of blue concentrate to ten gallons of water. Prices: Pints, $2.40; quarts, $3.60; gallons, $12.

The Miskella Infra-Red Co., East 73rd and Grand Ave., Cleveland 4, Ohio.
(MORE DATA? CIRCLE FYI 51, p. 147)



DRILLING, reaming, and spot-facing of automatic transmission housings is accomplished on this special machine tool. It has five stations, dial type, with power-driven index table. One operator finishes 85 pieces per hour at 100% efficiency.—*The Cross Co., Detroit 7, Mich.* (MORE DATA? CIRCLE FYI 52, p. 147)

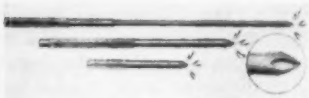


Axle on Motor-Driven Trolley Fitted With Removable Head

The Moto-Trolley is designed for attachment to any standard lug-mounted electric hoists and may be adjusted to accommodate a wide variety of beam sizes.

Each wheel is equipped with double-row precision ball bearings and a removable head on the axis is fitted with Alemite grease fittings. Transformer on the magnetic-contact panel reduces the voltage in the control circuit. A four-button control station operates the single-speed trolley and hoist motions.

Industrial Equipment Co., 315 N. Ada St., Chicago 7, Ill.
(MORE DATA? CIRCLE FYI 53, p. 147)



OTC Magnetic Screw Starter For Recessed Head Screws

Owatonna Tool has developed a magnetic screw starter that fits all sizes of Phillips, Reed, and Prince recessed head screws. The bit is designed to fit No. 1, 2, 3, and 4 Phillips screws as well as corresponding sizes in Reed and Prince screws. The bits are built of heat-treated alloy steel and are permanently magnetized.

Three lengths are available: 3 in. for use in close quarters, 6 in. for normal use, and 9 in. to reach inaccessible spots.

Owatonna Tool Co., 383 North Cedar Street, Owatonna, Minn.
(MORE DATA? CIRCLE FYI 54, p. 147)

FYI — FOR YOUR INFORMATION

- FREE details about new machines & tools
- FREE data on new materials or parts
- FREE shop calculators and data sheets
- FREE information from advertisers
- FREE advice on metalworking problems

FYI — these initials symbolize information that's important. We use them, too, to head our expanded reader service. Here are two postcards which will bring you new literature, bulletins on new equipment, materials or parts, further information from any advertiser, or advice from editors — for a 3-cent stamp.

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NEW BULLETINS

MACHINES AND ATTACHMENTS

1 JIG BORER—*Cleave Special Tool Co., Inc., Bridgeport, Conn.* 24-page catalog gives the design and operational features of the company's No. 2 machine. Covers the powerplant, depth-measuring device, spindle, quill, spindle head, and a method of measuring with headstops.

2 POWER WRENCH — *The Cushman Chuck Co. Hartford 6, Conn.* 8-page bulletin 215 provides descriptive and technical data on the wrench and control equipment for single-spindle machine tools. Gives end release workpiece.

3 AUTOMATICS—*W. K. Mellhenny Machinery Co., Indianapolis, Ind.* 8-page bulletin 110 illustrates and describes automatic and special production machines for drilling, boring, milling, and tapping.

4 AUTOMATIC PRESSES — *Di Machine Corp., Chicago 32, Ill.* 4-page folder describes a line of high-speed machines of 6-, 8-, and 12-ton capacities for the stamping of small parts. Specifications are included.

TOOLS AND ACCESSORIES

5 DIESETS — *Producto Machine Co., Bridgeport 1, Conn.* 72-page catalog covers master and commercial diesets, special sets (in semi-steel and steel), accessories, and machine-shop equipment. Selection tables and specifications are included.

6 THERMOMETERS—*The Electric Autolite Co., Toledo 1, Ohio.* Folder containing descriptions and specifications on 5 types of thermometers, bulbs, and fittings.

7 THREAD ROLLING — *Reed Rolled Thread Die Co., Worcester 1, Mass.* 16-page booklet on thread and form rolling, describing the process, application, and equipment. Gives data on both flat and cylindrical dies.

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FREE details about new machines & tools
FREE data on new materials or parts
FREE shop calculators and data sheets
FREE information from advertisers
FREE advice on metalworking problems

8 BROACHES—*The Kane Machine Co., Cleveland 10, Ohio.* 4-page bulletin 11, contains operating and engineering data, specifications, and prices on a line of adjustable push broaches and accessories.

HEAT TREATING AND WELDING

9 LOW-HYDROGEN ELECTRODES — *Arcos Corp., Philadelphia 12, Pa.* 8-page booklet compares mild-steel and low-hydrogen electrodes, as related to preheating, underbead cracking, cost, burn-off rate, and so on. Shows importance of low-hydrogen electrodes in welding various steels.

10 SALT-BATH FURNACE—*Ajax Electric Co., Inc., Philadelphia 32, Pa.* 4-page bulletin 132 describes the construction and operating characteristics of a salt-bath furnace employing totally submerged electrodes.

11 TUNGSTEN ELECTRODES — *Sylvania Electric Products Inc., Towanda, Pa.* 4-page folder describes pure tungsten electrodes for atomic hydrogen, helium, and argon arc welding.

PLANT SERVICE EQUIPMENT

12 CONVEYORS — *Anchor Steel And Conveyor Co., Dearborn, Mich.* 60-page book on new conveyor designs and applications. Deals specifically with conveyors for small parts, scrap, and chip handling.

13 PALLETS — *The Union Metal Mfg. Co., Canton 5, Ohio.* 24-page catalog covering a line of corrugated-steel box, skids, pallets, and combination units.

14 CENTRIFUGAL PUMPS—*Allis-Chalmers Mfg. Co., Milwaukee, Wisc.* 16-page bulletin catalogs close-coupled, pedestal, self-priming, and many other pumps. Head-capacity charts and specifications are included.

15 APRONS—*The B. F. Goodrich Co., Akron, Ohio.* 4-page catalog section covering a line of industrial aprons. Includes service recommendations and specifications.

16 FLUORESCENT LAMPS — *General Electric Engr. Div., Cleveland 12, Ohio.* 6-page folder covers a line of lamps and auxiliary equipment, including ballasts, starters, switches, and holders. Includes lamp data and wiring diagrams.

PARTS AND MATERIALS

17 SPEED REDUCERS — *The Cleveland Worm & Gear Co., Cleveland 4, Ohio.* 24-page booklet covers the company's AT and BT worm-gear speed reducers. Improvements such as face-type oil seals, and higher-horsepower rating tables are described.

18 PRECIOUS-METAL ALLOYS—*J. M. Ney Co., Hartford, Conn.* 32-page catalog contains information on physical properties, use and test data, and descriptions on standard contact and brush shapes being manufactured by the company.

19 GEARMOTORS — *Link-Belt Co., Chicago 31.* 16-page booklet describes gearmotors, Motogears, and helical gear drives; gives methods of selection; and tables on capacities and overhung loads.

20 NON-FERROUS FORGINGS—*Copper & Brass Research Assn., New York 17, N. Y.* 32-page handbook explains how brass forgings developed, what they are, and how they are produced. An illustrated section classifies forgings into 3 basic types.

21 SPEED REDUCERS—*The Falk Corp., Milwaukee 1, Wis.* 24-page booklet on a line of parallel-shaft speed reducers equipped with roller bearings. Gives methods of selection, horsepower-rating tables, and other engineering information.

22 THICKNESS TESTER—*Sperry Products, Inc., Danbury, Conn.* 4-page bulletin 3700 describes a portable ultrasonic instrument which provides visual indications of thickness.

23 RUST PREVENTIVES — *Non-Rust Chemical Corp., Chicago 8, Ill.* 4-page bulletin describes two new transparent rust preventives which replace heavy greases, varnishes, and lacquers.

24 BEARING BALLS—*The Abbot Ball Co., Hartford, Conn.* 16-page manual gives useful information on commercial bearing balls, burnishing materials, and barrel-finishing equipment.

25 LUBRICATING OILS — *Sun Oil Co., Philadelphia 3, Pa.* 12-page booklet illustrates and describes Sunvis H. D. 760 oils for circulating and hydraulic systems, compressors, gearboxes, etc.

26 FLAT STOCK—*Marshall Steel Co., La Grange, Ill.* 4-page bulletin covers a line of water-, air-, and oil-hardening flat stock. Chemical analyses and specifications are included.

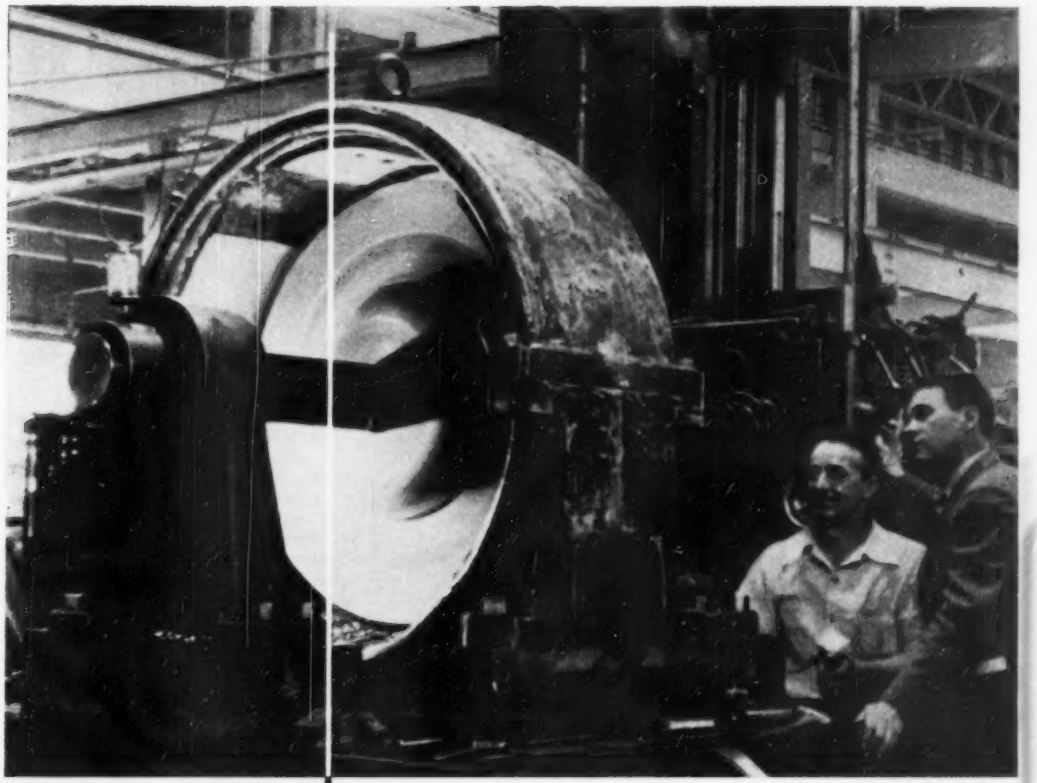
MISCELLANEOUS

27 TEMPLETS—*Ortman-Miller Machine Co., Inc., Hazelwood, Ind.* 5-sheet set of templets for design work involving air or hydraulic cylinders. Plan, front and end elevations for all of the company's cylinders, from 1- to 8-in. bores.

28 MACH NUMBERS—*Kollsman Instrument Div., 80-08 45th Ave., Elmhurst, N. Y.* Chart gives the standard values for measurement of high speeds in terms of Mach number, indicated air speed, differential pressure, altitude, and absolute pressure.

29 INSULATED CABINETS — *Remington Rand Inc., New York 10, N. Y.* 20-page booklet demonstrates the advantages of insulated cabinets over other safety equipment in case of fire.

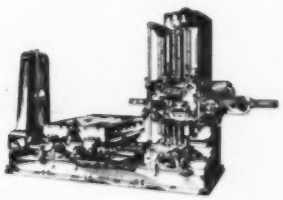
30 MARKING—*Jas. H. Matthews & Co., Pittsburgh 14, Pa.* 4-page bulletin illustrates and describes various methods and equipment used in marking products of all types and sizes.



GOING DOWN

boring time on elevator motor frame (time saved: 65%)

Previous time: 45 hours. Now 16 hours. Saved: 29 hours. The job: boring six internal pads (12¼" x 13") on 1020 cast steel motor frame. Bore diameter: 42". The machine: Cincinnati Gilbert 3½" Spindle Horizontal Rectangular Table Type Boring Mill. Boring bar: 5¾".



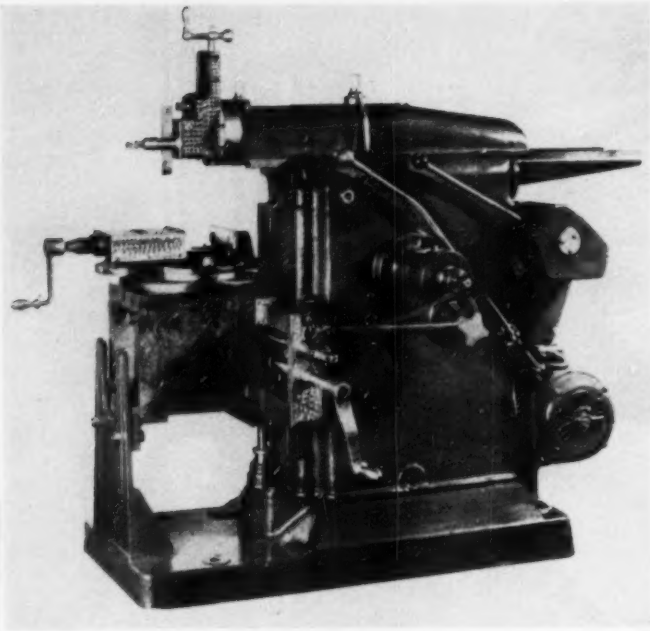
THE CINCINNATI

GILBERT MACHINE TOOL COMPANY

RADIALS • HORIZONTAL BORING MILLS • ACCESSORIES

This unusual job was done at Shepard Elevator Co., Cincinnati, Ohio with an ingenious tooling arrangement: 12 step tools on a cast aluminum boring head were arranged so that machining was continuous. Speed: 12 rpm. Feed: .125" per revolution on rough cut; .030 per revolution on finishing cut. Mr. E. R. Brodeen, Works Manager, states that the new GILBERT has displaced the old Boring Machine and practically eliminates a vertical Boring Mill from production. . . . Save time and money by replacing old equipment with modern Cincinnati Gilbert Boring Mills, and make a *high return on your investment.* . . . The Cincinnati Gilbert Machine Tool Co., 3360 Beekman Street, Cincinnati 23, Ohio.

THOSE WHO BUY GILBERT BUY GILBERT AGAIN



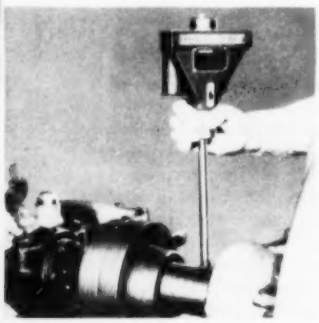
High-Speed Shaper Has 14-in. Stroke and 26-in. Ram

Table surface	14 x 10 in.
Maximum ram to table	16 in.
Longitudinal traverse	16 in.
Vertical traverse	14 in.
Maximum tool down feed	5 in.

A high-speed floor-model shaping machine with 14-in. stroke and 26-in. ram is available through DCMT Sales Corp. Ram speeds vary from 27 to 140 strokes per minute. The ram slides are V-sections, with large bearing areas and adequate cross-section. The automatic horizontal-feed motion is arranged to give four variations of feed per ram stroke. The drive is transmitted by three V-belts through a multiple-disk friction clutch to a totally enclosed four-speed box.

DCMT Sales Corp., 164 Duane St., New York 13, N. Y.

(MORE DATA? CIRCLE FYI 66, p. 147)



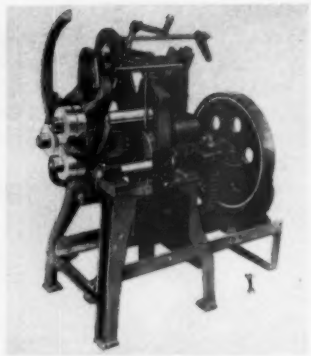
Davey Vibrometer Measures Vibration Amplitude Instantly

The Davey Model-P vibrometer is applied by holding it manually against the machine to be checked. The width of oscillation of a light beam on a graduated ground-glass scale indicates the vibration amplitude. Two models are available which magnify the motion 250 and 125 times respectively.

Flashlight batteries are housed within the instrument. A detachable probe 8-in. long enables measurements to be taken directly on the surface of a rotating shaft. The probe is also useful for reaching down into inaccessible or hot places. It is housed in a tube and runs in longitudinal ball bearings to minimize side friction. The probe head may be adapted to previous models of the vibrometer.

The Vibroscope Co., 6 East 39th St., New York 16, N. Y.

(MORE DATA? CIRCLE FYI 67, p. 147)

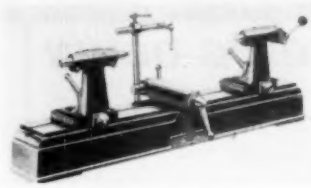


Excelsior Bending Machines Roll Part or Complete Circles

This reversible circular bender will roll part or complete circles on angles, flats, pipes, rounds, and other cross-sections. Finger-tip push buttons control forward, reverse, stop, and inching movement of the rolls. Capacity is 2x2x¼-in. mild-steel angles or its equivalent. The graduated scale on the adjustment rod is for the purpose of predetermining the approximate diameter of the material rolled.

Excelsior Tool & Machine Co., East St. Louis, Ill.

(MORE DATA? CIRCLE FYI 68, p. 147)



Indicator Support Bracket Locks on Bed of Bench Center

Furnished with a universal indicator support bracket, the Delta-Milwaukee bench center is said to be a completely self-contained unit. The bracket can be quickly and firmly locked on the bed. The arm for holding the indicator can be put into any position, vertical or horizontal, by means of a clamp handle

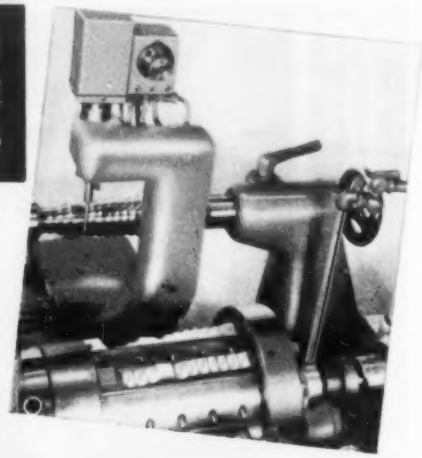
Construction features include: heavy cast bed, fully normalized to relieve all strain. Accurately ground top surface, with milled T-slot for clamping head and tail stock and indicator support bracket. Precision-bored head and tail stocks that are identical castings and therefore interchangeable. Hardened and ground 60°-angle centers.

Delta Power Tool Division, Rockwell Mfg. Co., Milwaukee 1, Wis.

(MORE DATA? CIRCLE FYI 69, p. 147)

SAVED! 1 HOUR AND 55 MINUTES PER PIECE IN PRODUCTION TIME—COSTS

SIDNEY FLUID TRACER TIME ONLY 10 MINUTES



From round or flat templates or regular lathe work without limiting range.

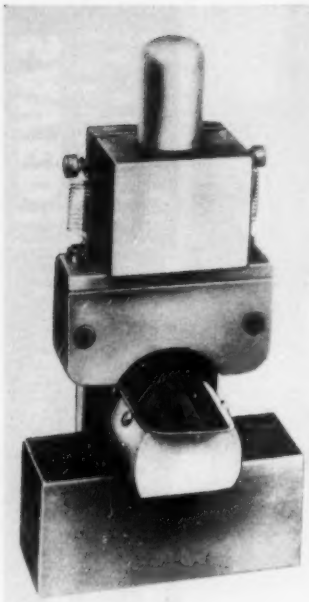
RUGGED... Built to take continuous intermittent cutting with amazing savings on pieces as illustrated.

Get the "inside story"—write direct or contact nearest SIDNEY representative.

SIDNEY HEAVY-DUTY LATHES

SIDNEY MACHINE TOOL COMPANY • SIDNEY, OHIO

BUILDERS OF PRECISION MACHINERY SINCE 1904



Stamping Fixture Permits Straight Type for Curved Marking

An improved retaining feature has been incorporated in this stamping fixture for stamping round or curved metal parts. It allows the characters to stamp on a specified curved radius, eliminating the need for retaining pins and slotted type. The holder can be made suitable for one or two rows of type, which are changed by removing the face plate of the holder. The number of characters that can be used are limited by size of characters and radius of the piece to be marked.

Known as PF-20 periphery stamping fixtures, they are usually made to order for marking a specific part, but they also can be manufactured adjustable for use on various shapes and sizes. However, when the degree of curvature changes, a different type holder must be used.

E. M. Cunningham Co., 95 E. Carson St., Pittsburgh 19, Pa.

(MORE DATA? CIRCLE FYI 70, p. 147)

Overcurrent Relay Features Extremely Inverse Characteristic

This overcurrent relay has all the features and the appearance of the company's other models, except for the following characteristics: It is said to have the most inverse current-time characteristic available. In application it coordinates with fuse curves over a wider range of currents than previous overcurrent relays. It can be used to advantage where a long time delay is required for light overloads such as encountered when a feeder is re-energized after an extended outage. The burden is low, being approximately 0.3 volt-amperes at tap values of current. Construction is non-geared, induction disk.

Westinghouse Electric Corp., 306 Fourth Ave., P. O. Box 1017, Pittsburgh 30, Pa.

(MORE DATA? CIRCLE FYI 72, p. 147)

Nailing Made Five Times Faster By Portable Machine

Heller has developed an automatically fed portable nailer which is said to be five times faster than ordinary nailing. It drives and countersinks the longest Heller lock nail with one touch of the pedal. It has a two-way adjustable table to handle a large variety of work.

The feeding chamber holds over a hundred lock nails that are adhered together in one strip for fast loading. The driving mechanism is built of tool steel for heavy-duty jobs. Lock nails come in sizes ranging from $\frac{3}{8}$-in. to 1 3/16-in. long, and are spear pointed.

The Heller Co., 2153 Superior Ave., Cleveland 14, Ohio.

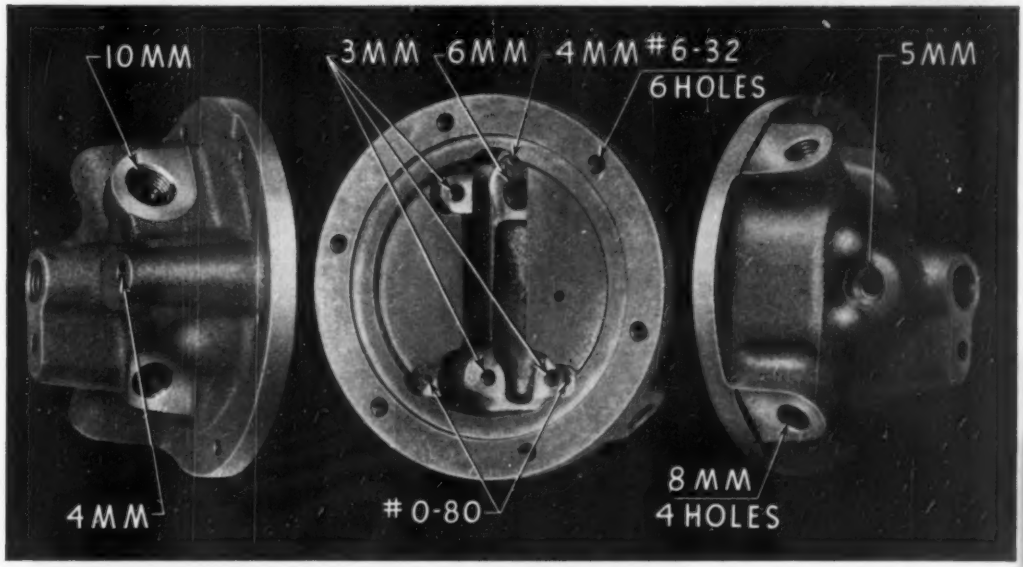
(MORE DATA? CIRCLE FYI 73, p. 147)

CRITICAL DIMENSIONS of a precision eccentric shaft are checked simultaneously on this Electrolimit gage at a rate of 300 parts per hour. One operator inspects diameters, bearing concentricity, bearing taper, and throw of eccentric in a single operation. Gaging is completely automatic, so that the operator merely loads, notes the dial readings, and unloads.—*Pratt & Whitney, West Hartford 1, Conn.* (MORE DATA? CIRCLE FYI 71, p. 147)

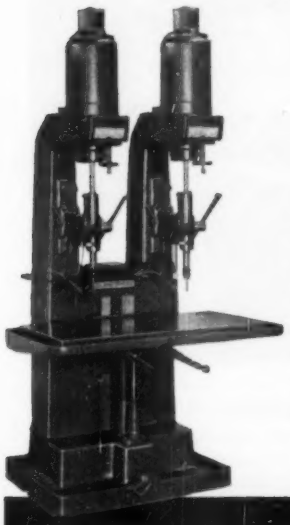
Anti-vibration kit is said to eliminate up to 75% of the vibration and shock caused by machinery. It consists of a 12-in.-square rubber pad, rubber tubes, thick washers, and an instruction booklet. It enables the small plant owner to handle problems of industrial vibration too small to justify the use of technical personnel. — *The B. F. Goodrich Co., 10 E. 40th St., New York 16, N. Y.*

(MORE DATA? CIRCLE FYI 74, p. 147)

Can you top this for tapping?



All these gas tight, fine thread holes tapped as routine production



by AMERICAN GAS ACCUMULATOR COMPANY
on a LELAND-GIFFORD
No. 2-LMS Reversing Motor DRILLING MACHINE

Lighthouses, airway beacons, airport lights . . . to assure unfailing operation of these vital units, American Gas Accumulator Company of Elizabeth, New Jersey, builds them with instrument precision. Shown here is only one of many critical parts tapped by AGA on a standard Leland-Gifford No. 2-LMS Drilling Machine with reversing motor control for tapping.

Note the range of sizes — all the way from #0-80 (pitch dia. 0.0519″) to 10 mm. (pitch dia. 0.3554″) — in tough Navy Bronze with all tapped holes gas tight. The same machine, incidentally, is used to tap full depth ¾″-14 Whitworth pipe threads (1.063″ OD). Between tapping jobs — with a flick of a switch and a quick tool change — it does double duty as a drilling machine — accurate, sensitive and with a wide range of spindle speeds.

Think what a production drilling machine like this could do for you in your shop or toolroom . . . tough jobs made easy, time saved, costly operations made profitable. Look into it today. Write for complete information.

PRODUCTION MEN
Get This Handy Slide Rule

A valuable aid in figuring costs and setting production schedules. Quickly gives time required to drill holes of any size and depth in any material. It's free. Write the nearest office.

LELAND-GIFFORD
Drilling Machines
WORCESTER 1, MASSACHUSETTS, U.S.A.

CHICAGO 6, 565 W. Washington Blvd.; DETROIT 26, 1533 Dime Bank Bldg.; CLEVELAND 1, P. O. Box 5647; NEWARK 2, Industrial Office Bldg.; ROCHESTER Commerce Bldg.; LOS ANGELES 14, 724 So. Spring St.

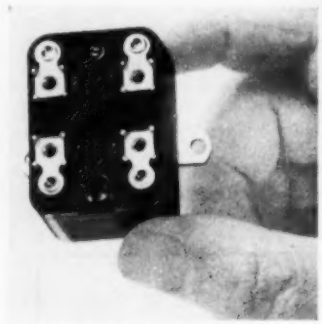
O-Vee Thread Gauge Indicates Actual Thread Size

Based on the three-wire method of thread measurement, this device is said to overcome the limitations of ring gages by indicating the actual size of the thread. It also provides information on the pitch diameter, without the necessity of calculations or reference tables.

The coil is inserted by depressing the lever and insert screw. Micrometer measurement is then taken over the coils, and the reading is compared with limits on the attached data plate.

The cutting edges of taps are liable to cut into standard O-Vee gages and for this reason tap gages are chromium plated and calibrated to suit standard specifications. The gages can be supplied for right- and left-hand threads, most thread forms, and standard and non-standard pitches upon request.

O-Vee Spring Gauge Company, Los Angeles, Calif.
(MORE DATA? CIRCLE FYI 75, p. 147)



R-B-M Motor-Starting Relay Mounts In Any Position

A relay developed by R-B-M has been field tested for several years in controlled applications. It is a current type, having a balanced-armature construction which does not restrict mounting to any one position. Use of the relay instead of a centrifugal switch is said to permit smaller overall motor dimensions and to have a wide application.

R-B-M Division, Essex Wire Corp., Logansport, Ind.
(MORE DATA? CIRCLE FYI 76, p. 147)

Lima Gearshift Drive Uses Primary and Secondary Reductions

A selective-speed gearshift drive has been added to the Lima motor line. This unit, designated as Type R3AC, incorporates both primary and secondary gear reductions. It is designed to individually motorize and drive machinery that requires a low range of operating speeds, combined with high radial-load capacity.

A compact combination of a 5-hp 1200-rpm integrally mounted electric motor and a four-speed sliding-gear transmission provide a choice of output speed combinations from 123 to 1140 rpm.

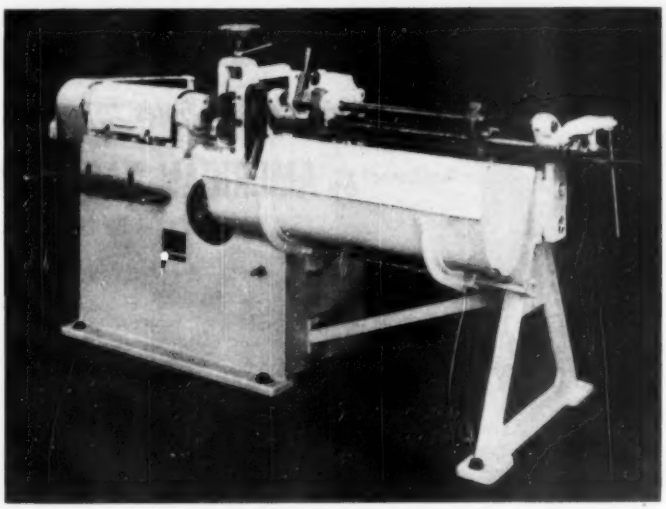
The Lima Electric Motor Co., Lima, Ohio.
(MORE DATA? CIRCLE FYI 77, p. 147)

Complete Sandwich Braze Cuts Down on Handling Time

A sandwich braze called Bondwich consists of two sheets of brazing material and a stress-absorbing shim bonded into a single sheet for easier handling. The bond is such that when the brazing temperature is reached complete wetting takes place. This is said to make possible a minimum of voids in the final braze, inasmuch as the evenly wetted shim carries the braze all over. A surface pattern in the form of capillary channels eliminates the danger of flux inclusion.

Made of a copper-nickel alloy, the shim is said to have greater strength and greater resistance to peening than copper, and to be more able at relieve brazing stresses than nickel. The solder used forms 25% of the total thickness on each side. Stocked in a number of sizes.

General Plate, Div. of Metals and Controls Corp., Attleboro, Mass.
(MORE DATA? CIRCLE FYI 78, p. 147)



Pullmax Wire Straightener Employs Rotating Dies

A wire-straightening machine, called the TM-6, is entirely automatic; taking wire from a reel and feeding it into rotating straightening dies. These dies subject the wire to repeated rotary bending which removes internal stresses.

The wire is fed by a pair of transport rollers onto a guide bar where it makes contact with a stop that actuates the cutting mechanism. At the moment of cutting, the feed motion is disconnected so the transport rollers will not slide against the stationary wire. The rate of feed varies from 56 to 181 fpm. The machine will handle wire of any desired length up to 19½ ft. All meshing parts are hardened and ground.

American Pullmax Co. Inc., 2627 North Western Ave., Chicago 47, Ill.
(MORE DATA? CIRCLE FYI 79, p. 147)

Hjalmar Ellstrom

INVENTOR OF THE GAGE BLOCK

The achievement of perfection . . . the complete mastery of any art or craft or science . . . is a rare human accomplishment. A discovery or an invention that contributes to the progress and total welfare of all mankind is rarely the heritage left by a single man. So rare is it, indeed, that in such infrequent instances, the true facts surrounding its origin are often distorted, obscured, or even lost in the conflicting claims of others who would seek the personal worldly gains to be derived from undeserved fame.

So it was with the Gage Block. For, actually, this basic standard of measurement now used the world around was originally conceived, developed, and invented solely and entirely by . . . Hjalmar Ellstrom.

Here, briefly, is the story of his accomplishment: During the early 1890's, Hjalmar Ellstrom was employed by the government rifle factory at Eskilstuna, Sweden. He was a master craftsman . . . a man of infinite patience who took great pride in his work. He was a man of vision, too, who recognized the limitations imposed upon industry by the lack of sufficiently accurate measuring devices. So, with a then unheard of standard of precision as his ultimate goal, he alone developed and perfected his checking instruments and techniques . . . then alone he created the world's first gage block accurate to the infinitesimal millionth part of an inch.

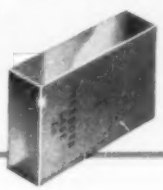
Today, though his achievement has been copied and imitated by others, his personal unqualified devotion to accuracy is the exclusive heritage of Ellstrom.

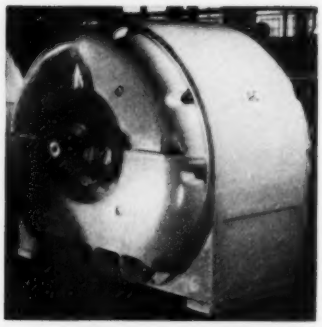
ELLSTROM . . . *measuring in millionths for three generations*

DEARBORN GAGE COMPANY

22035 BEECH STREET • DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks





Allis-Chalmers Induction Motor Provides More Protection

Allis-Chalmers has redesigned its standard line of large, bracket-bearing, squirrel-cage induction motors of four and more poles.

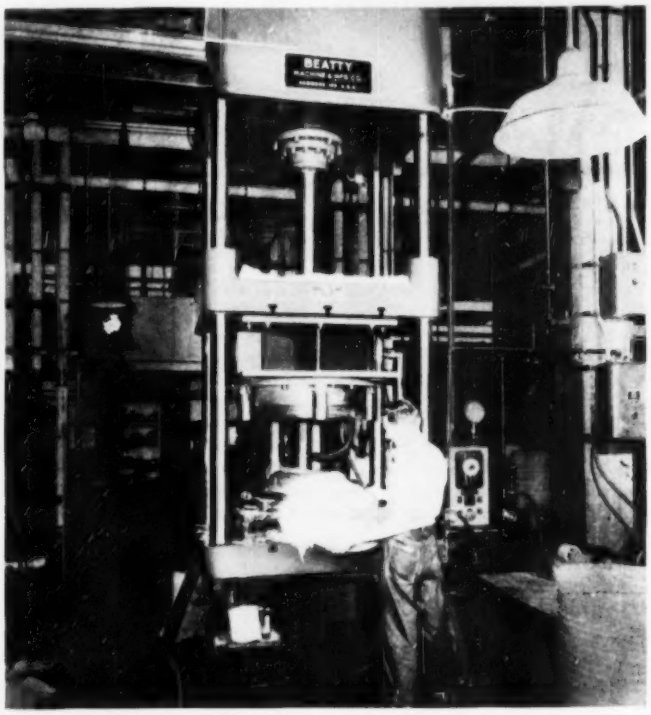
Capsule sleeve bearings are standard. The split, cast-iron bearing capsule or housing has a machined flange for bolting to the bearing bracket. This permits removal of the upper half of the bracket for inspection or cleaning without exposing the inside of the bearing. Similarly, the air-discharge openings in the side of the stator yoke facilitate vacuum cleaning or blowing out of the air passages behind the stator core.

Since the only opening in the bearing brackets are in the air intakes near the bottom, the brackets afford effective protection for the ends of the motor. This construction, plus the use of louvered panels in the stator air-discharge openings, makes the standard design drip proof.

Allis-Chalmers, Milwaukee, Wis.
(MORE DATA? CIRCLE FYI 80, p. 147)

Light concentrator for use wherever fine work is done. It produces a spot of illumination approximately 4 in. in diameter 12 in. from the bulb. It uses a plastic lens ⅛-in. thick by 2½-in. diameter with an effective focal length of 2½ in. It can be quickly clipped on any frosted light bulb from 40 to 100 watts.

Clarkstan Corp., Los Angeles 64, Calif.
(MORE DATA? CIRCLE FYI 81, p. 147)



HYDRAULIC PRESS shapes and cures liners for automatic washers. A single electric control provides rapid approach to a preset slowdown position, slow or pressing speed to dwell position, dwell for curing, and rapid return to up position. The complete cycle is automatic, with inching controls provided.—*Beatty Machine & Mfg. Co., Hammond, Ind.* (MORE DATA? CIRCLE FYI 82, p. 147)

Preset Speed Device Installed in GE Motor

The General Electric ACA motor is now available with a mechanical follow-up control for achieving a fixed preset speed without the use of expensive control equipment. The device can be set by a knob on the motor or at the end of a flexible cable 10 or 15 ft away. The adjustment can be made while the motor is at a standstill or while it is running.

The mechanism actuates a pilot motor which drives the brushes to a position corresponding to the setting of the speed-adjustment knob. A stop or automatic slow-down returns the brushes to the lowest speed position without disturbing the original setting. When the motor is restarted, the brushes again come back to the preselected speed without any attention from the operator. Accelerating time is dependent upon pilot-motor speed.

General Electric, Schenectady 5, N. Y.
(MORE DATA? CIRCLE FYI 83, p. 147)

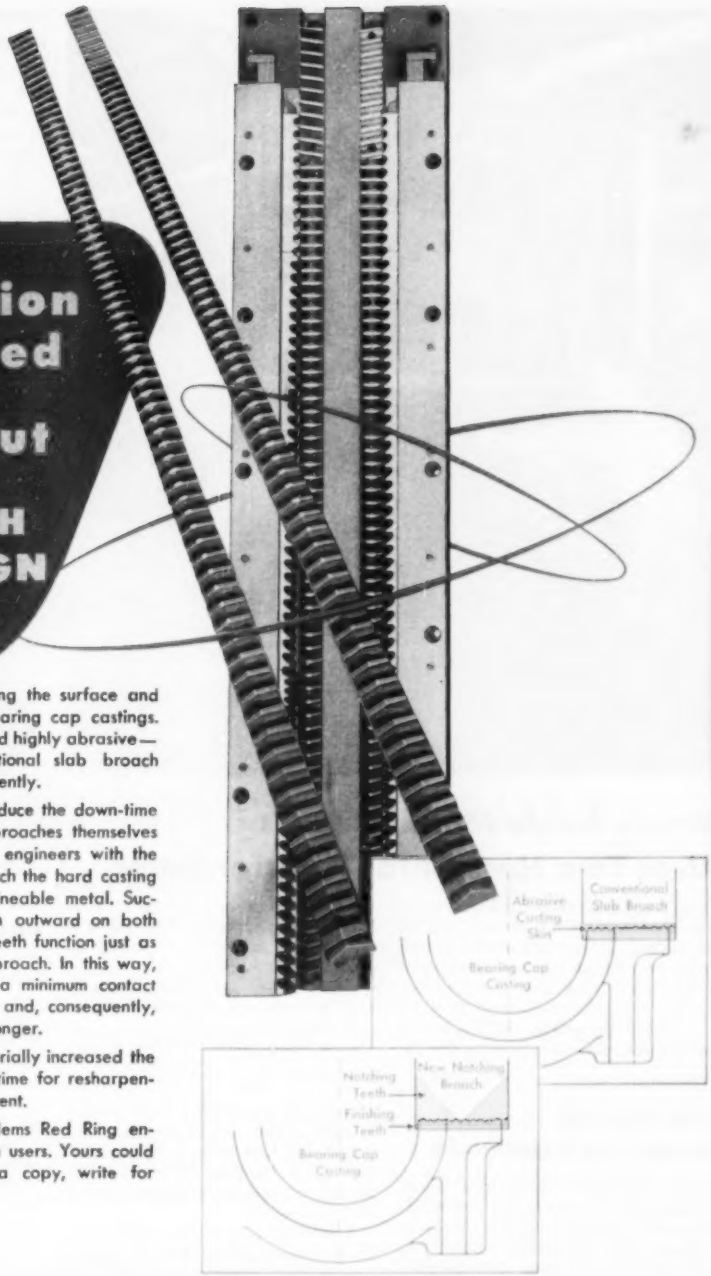
Sealed-In Steel Container Cuts Packing Costs

This airtight reusable steel container has an inner pack holding the contents firmly in place, allowing an inch clearance on all sides. There is said to be no need for cosmaline or other preventive measures. A supply of silica gel placed inside prior to sealing will keep the contents ready for instant use.

The containers are readily marked for identification purposes and, packed in pallet form, provide an easy means of handling. Special units are engineered where necessary.

Steel Drum Packaging and Accessories Inc., 9505 Sandusky Ave., Cleveland 5, Ohio.
(MORE DATA? CIRCLE FYI 84, p. 147)

Production increased and costs cut by BROACH REDESIGN



The job in question is broaching the surface and edges of automotive main bearing cap castings. The surface skin is very hard and highly abrasive—so much so that the conventional slab broach requires sharpening very frequently.

To get more production and reduce the down-time for regrinding broaches, the broaches themselves were redesigned by Red Ring engineers with the forward teeth V-shaped to notch the hard casting surface down to readily machineable metal. Successive teeth extend the notch outward on both sides while the final finishing teeth function just as those of a conventional slab broach. In this way, broach teeth are exposed to a minimum contact with the abrasive casting skin and, consequently, hold their cutting edges much longer.

These new broaches have materially increased the parts per grind and the down-time for resharpening has been reduced 70 per cent.

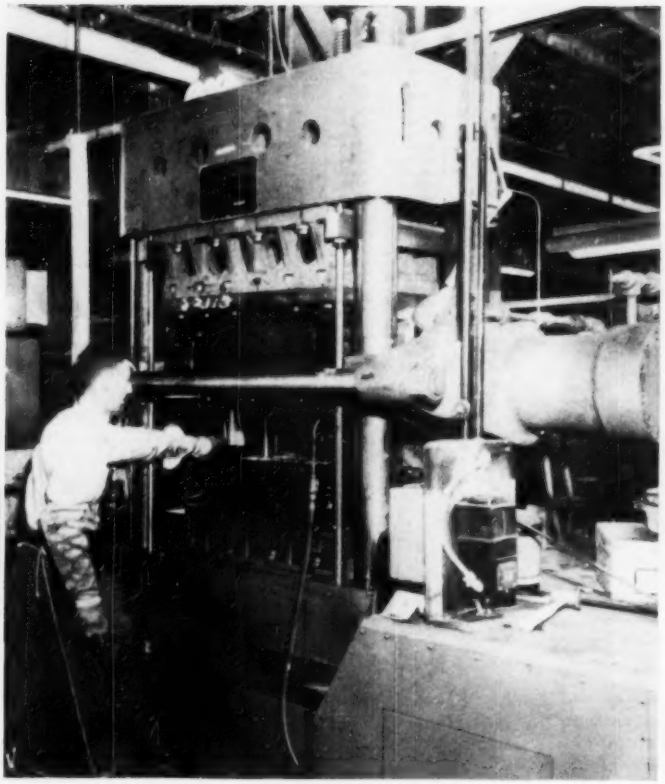
This is one of the many problems Red Ring engineers have solved for broach users. Yours could be the next. If you haven't a copy, write for Bulletin 49-11 on broaching.

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

5643

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT



Elmes Angle Molding Press Uses Two Horizontal Transfer Rams

This is a standard 300-ton Elmes compression-molding press modified to meet special requirements. Equipped with two 50-ton horizontal transfer rams, it averages 27 to 31 cycles per hour.

A large die space, readily accessible front and back, makes die installation easy and permits faster loading of pre-forms. The press is push-button controlled and has an automatic time cycle.

Elmes Engineering Div., American Steel Foundries, 1165 Tennessee Ave., Cincinnati 29, Ohio

(MORE DATA? CIRCLE FYI 85, p. 147)

Clark Fork Truck Equipped with Magnetic Drive

Clark fork-lift trucks are being equipped with Dynatork drive, which transmits engine power to the drive wheels by magnetic induction, through an air gap. Conventional transmission is replaced by a constant mesh, two-speed, forward and reverse gearing. Several sources of wear are eliminated.

In general, the drive is said to eliminate jerks, repeated shifting of gears when operating in close quarters, and excessive waste of power. "Inching," for maneuvering in tight quarters is accomplished by depression and release of a pedal. The drive permits reversal of direction without bringing the machine to a full stop.

A safety device automatically locks the direction-control lever to neutral the instant the driver leaves his seat. The lever cannot be moved from neutral until the driver resumes his seat or until an equivalent weight depresses the seat to the unlocking point.

Clark Equipment Co. Industrial Truck Div., Battle Creek, Mich.

(MORE DATA? CIRCLE FYI 86, p. 147)

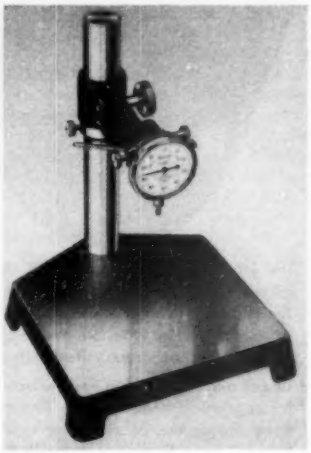
Graymills Coolant Systems Available in a Heavy-Duty Line

A line of heavy-duty coolant systems and pumps has been announced by Graymills. These self-contained gear or centrifugal units are supplied in 1/25, 1/12, ⅛, ¼, and ½ hp sizes.

As little as 5 to 20 minutes is said to be required to convert machine tools to wet cutting using Graymills systems. Some other uses for these systems are circulating coolants through welding machines, and applying lubricants to stock on punch-press operations. The motors have grease-sealed ball bearings and are totally enclosed.

Graymills Corp., Evanston, Ill.

(MORE DATA? CIRCLE FYI 87, p. 147)



Fine Vertical Adjustment Put In Starrett Dial Comparator

The Starrett 653 dial comparator is designed for inspection operations, and for use in toolrooms and machine shops on a wide variety of applications. The base-platen is precision ground to close limits, and is approximately 8x9 in. in area.

A sliding ring with locking screw below the dial indicator bracket permits positioning the indicator to either side for measurement at any point relative to the base. The ring also acts as a safety feature preventing accidental dropping and damage. Fine adjustment of the indicator is provided by means of a knob-operated rack and pinion at the end of the indicator bracket. The standard unit is graduated in 0.001 in., dial reading 0-50-0, range 0.250 in. Other indicators available if specified.

The L. S. Starrett Co., 101 Crescent St., Athol, Mass.

(MORE DATA? CIRCLE FYI 88, p. 147)

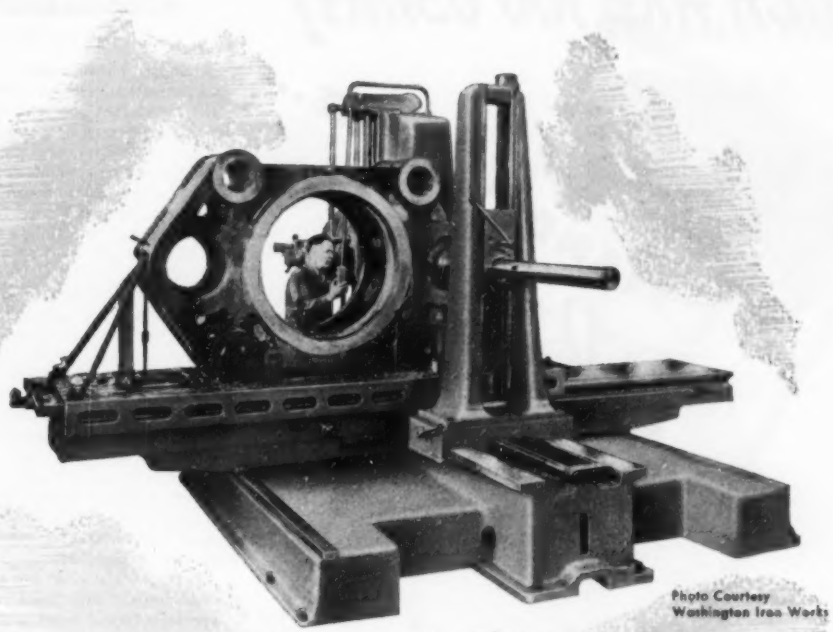


Photo Courtesy
Washington Iron Works

"THIS LUCAS CUTS COSTS IN HALF," says the owner

New Series 542 B-120, 4-way bed, Lucas shown here set up to line bore a 5 ton steel casting. Extra wide 120" bed permits long table cross travel. Outer ways are cast integral with bed.

In the plant of Washington Iron Works, Seattle, Washington, working on pieces up to ten tons, "Production time was improved 59% on one typical operation — 40% on another, compared with previous methods using other modern machine tools," to use the customer's own words.

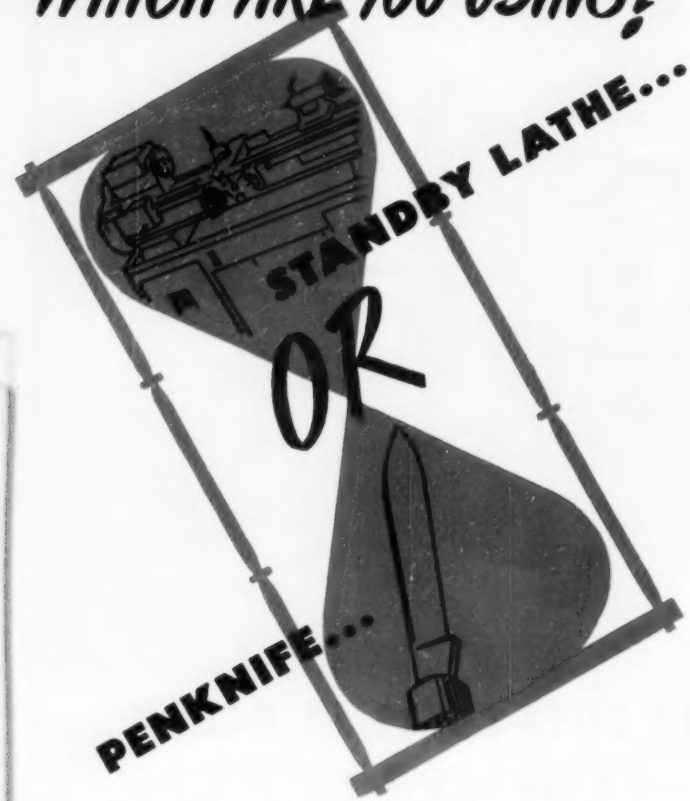
Whether your work is large or small, single pieces or production operation, there's a Lucas size and type for your needs. Write for literature.

LUCAS OF CLEVELAND

LUCAS *Precision*

HORIZONTAL BORING, DRILLING AND MILLING MACHINES
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO.
CLEVELAND 8, OHIO

IN FITTING PARTS FOR ASSEMBLY
WHICH ARE YOU USING?



An expensive lathe, used intermittently, wastes time and money.

Yet a penknife—and a LAMINUM shim—make spacings in thousandths a routine matter!

It's because these *adjustable* shims are fabricated from stock containing from 3 to 63 layers of .002" or .003" brass or steel, solidly bonded together. The laminations peel easily with a penknife.

Interesting?—SEND TODAY for our free engineering data file and sample of LAMINUM.

LAMINUM
THE SOLID SHIM
THAT PEELS FOR ADJUSTMENT

LAMINATED SHIM COMPANY, INC.
3110 UNION STREET GLENBROOK, CONN.

CUSTOM SHIMS

STAMPINGS SHIM STOCK AN·COR·LOX NUTS

ROUND TABLE Discussion

RAT'S NEST

Is sloppy housekeeping in a plant an indication of sloppy morale? The answer to that one is in the affirmative. No manager or foreman of tidy mind and habit could stand for useless junk lying around or even usable material, not immediately required, cluttering up useful production space. A weakness for pictures featuring scantily clad women could be regarded as proof of artistic leanings but a foreman might well be pardoned for regarding it as an indication of something less commendable. If there *is* a place in our lives for doubtful pictures, that place is surely not a workshop. If we incline to lazy, slovenly habits and an untidy appearance we should reflect, even if *we* don't mind, that we may be offending others, such reflection should make us think again.

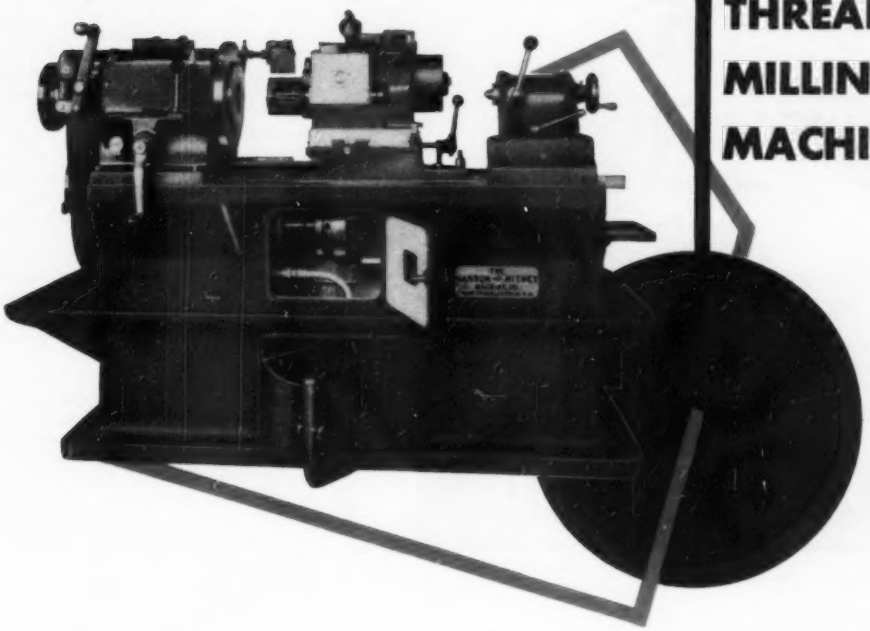
In a workshop, it is vitally necessary that men *and* women should be held to tight standards of discipline in the matter of appearance and deportment, and "held", here, is a specially happy word, since the indirect method of approach is productive of more lasting and satisfying results in such matters. If we think of the word "held" in the sense of the competent artist "holding" an audience, we begin to appreciate the value of the theory of management by example. Every foreman and manager should realize that *he* is, or should be, to some extent, an artist with an audience to hold and that *his* appearance, deportment and conduct are his working tools just as much as are his knowledge and skill.

The things *he* does and the way he does them inside the shops and, who knows, perhaps outside, can help or hinder the quality and quantity of production and the manager or foreman who believes in and practices management by example will always be treading closer on the heels of perfection than he who is indifferent to appearances.

Walking through a shop recently the writer saw a young charge man coming down the floor carrying a light connecting rod, he was dressed in a clean white coat and a checked cap on his head sat at a jaunty angle. Aloft, he held the connecting rod, a little above shoulder height, in an apparently effortless manner, his step was light and his whole bearing conveyed the impression that he thoroughly enjoyed the job. The man's

PERFECT THREADS external or internal

NO SPOILAGE with Hanson-Whitney THREAD MILLING MACHINE



Today's requirements for low cost, perfect threading of so many, so varied and such costly metal parts make it necessary that work spoilage be eliminated.

The "Milling Process". . . and, in particular, the Hanson-Whitney Semi-Automatic Thread Milling Machine . . . gives you 100% perfect threads. And it produces at high speeds on many materials, otherwise difficult to machine.

Because of the Multiple Cutter principle used, threads of varied lengths are completed in one revolution of the work. Threading may be right or left hand, external or internal, straight or tapered. All operations are automatic except insertion and removal of work.

Three machine sizes permit External Threading from ¼" to 10" dia.; Internal Threading ¾" to 10" dia. The size pictured above (the largest) has a capacity of 10" dia. x 24" length.

For low-cost, perfect threading select the H-W Thread Miller . . . a standard of highest quality throughout the industrial world.

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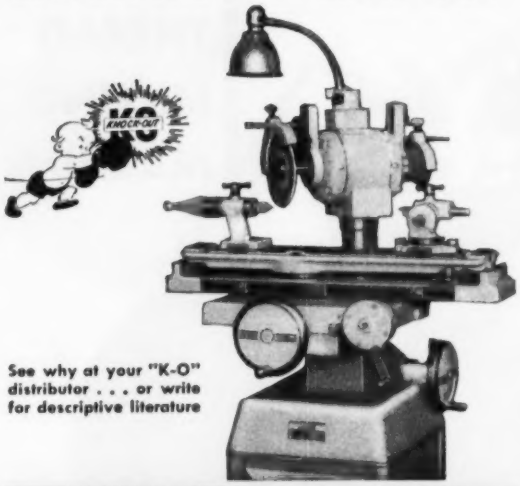
There's a reason . . . 85% of all popularly-priced Tool and Cutter Grinders sold are *"Knock-outs"*



See why at your "K-O" distributor . . . or write for descriptive literature

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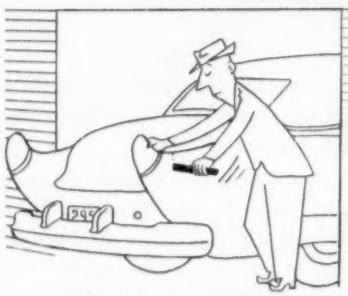


It's the CUT that COUNTS

and Capewell HACK SAW BLADES offer 2 Exclusive Advantages . .

Ask Your Distributor about . . .

Capewell hack saw blades and frames, band saws (in coils or welded), Dafiles, ground flat stock, hammers, pipe and bolt threaders, pipe cutters, pipe reamers, pipe vises, tubing cutters, power pipe machinery.

1 A bonus of 10% additional cutting—because Capewell's exclusive "Statistical Quality Control" raises standards and eliminates sub-standard blades.

2 Instructions printed right on the hand hack saw blades indicating correct use.

CAPEWELL
THE KEY TO ECONOMY

THE CAPEWELL MFG. CO. DEPT. 310, HARTFORD 2, CONN.

appearance and deportment immediately impressed the writer. His carefree vitality seemed to say "there's no fun like work."

Strict discipline, intelligently purveyed, will always show better all round results than relaxed control which so speedily degenerates into lax control. Those remarks apply chiefly, of course, to non-piecework shops, the price for the job, if correctly fixed, provides the discipline in the shops operating on a piecework basis. The certain way to ensure good discipline in the shops is for the foreman to discipline himself, if he does that properly, discharges his own duties regularly and honestly, seeking no favor or privilege for himself, he will have done all that is required to bring about a high standard of discipline among the workers. That plan is much more profitable, lasting and effective than occasional talks on efficiency, with sluggish intervals of deterioration.

"Ed" lets the cat out of the bag by admitting that when he "let things slide" the men did likewise, naturally! Correct conduct by foremen and managers makes pep talks unnecessary. Actions speak louder than words and the foreman who thoroughly disciplines himself is continually talking to his men *without* having to speak to them. There is no point in a foreman "talking fresh" to the men if *he* does not set the correct example. If he does set a correct example, each day, he is unconsciously giving pep talks that cannot fail to influence the conduct of the men for good.

C. D. Mackinnon
Airdrie, Scotland

•

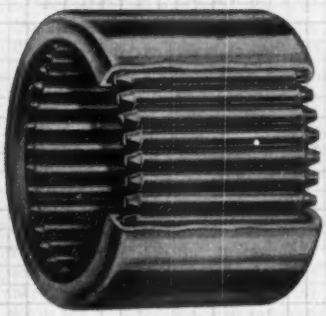
Is sloppy housekeeping in a plant an indication of sloppy morale? Many years ago, as the result of experience in a number of works, the writer came to the conclusion that slackness at the bottom was but the reflection of a similar condition at the top, whether of organization, supervision, or control of material, and that this condition, in Aime, filtered downward, permeating every department. The junk and, it may be, other things found under Robert's bench, represent a condition of things not uncommon in many works; and, where this junk includes material which ought to be in stores, a condition of sloppiness is indicated. This can show up in various ways.

The writer calls to mind two works where the belief was held that if orders and the material were "pumped" into the shops, output would be bound to follow. It did,

known by the company they keep

This is one maxim that certainly applies in the case of Torrington Needle Bearings. The list of Needle Bearing users reads like a "Who's Who in American Industry." There's no better proof of the soundness of engineering embodied in Needle Bearings than their excellent performance in thousands of famous-name products.

In your automobile, lawnmower, outboard motor, sewing machine, hand drill . . . and in farm equipment, textile machines, machine tools, aircraft—Needle Bearings help ease your work and keep our economy going. Why not add your product to the growing list of those that benefit from Needle Bearing operation?



THE TORRINGTON COMPANY

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TORRINGTON *NEEDLE* BEARINGS

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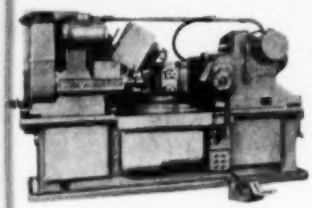


GOSS and DE LEEUW
CHUCKING
MACHINE

When any of the various functions for which this machine is designed are performed on it, no further machining is required. The job is finished.

The basic "1-2-3" method-exclusive with Goss & De Leeuw—provides for gripping work in the chuck and machining all ends either simultaneously or in sequence. By eliminating several handlings and set-ups, the "1-2-3" method produces finished pieces at a fraction of the time and cost ordinarily required.

Send samples of your work for time estimates. Ask for illustrated literature containing detailed information.

GOSS & DE LEEUW

GOSS and DE LEEUW
MACHINE COMPANY, KENSINGTON, CONN. U.S.A.

but not that which was needed, either in quantity, product, or date. Both firms manufactured for stock, from which customers' orders were supplied. In one instance, it was advised that, excepting in the case of special orders, no shop orders or material should be issued for one month. Output went on as usual; material accumulations were cleared or returned to stores—such as could be found. In the other, it was found, for example, that orders and material for ten batches of work, each involving fifty hours work only had been lying in the shops for up to four years. There were many such. Overtime was being worked because of the supposed amount of work ahead. In each case, it was because of sloppy housekeeping or, more correctly, sloppy management. In the latter case, plans were out for extending the works. These did not proceed—they were unnecessary.

There is nothing mysterious about works management, provided the "powers that be" know their jobs. Monthly talks — outside working hours—may help, but, if an apple be rotten at the core, no amount of pretty talk will make such talks succeed, and all too often the chairman of such a meeting represents the faculty core—bleating for help, wasting production staff time in so doing.

P. E. James
Lindum, England

•

WHOSE BUSINESS?

MANAGEMENT should inform the employees what's going on. In many shops even the foremen do not know the management's plans from month to month. They are not informed on what changes are to be made until the last day of the budget month. The employees know that new orders have been placed when old employees return or new faces appear. When employees are laid off they know that orders are not coming in.

Management has itself to blame for many of the conditions which now exist. Government restrictions, government controls and socialistic systems have been brought on through management's failure. Business has been only half awake to the fundamental principles of good industrial relations. When the employee wanted human treatment and the opportunity to suggest or criticize without fear of reprisal he was given the cold shoulder. This had nothing to do with wages, hours or pensions. The employee did the next best thing, he joined a union. Employees joined unions because they found expres-

Parts for NEW "Caterpillar" Tractors machined by KENT-OWENS

New "Caterpillar" Diesel DW20 Tractor and W20 Wagon hauling heavy clay.

After five years of research, testing and proving—"Caterpillar" has announced two great new Tractors . . . and Kent-Owens Milling Machines help to save production costs.

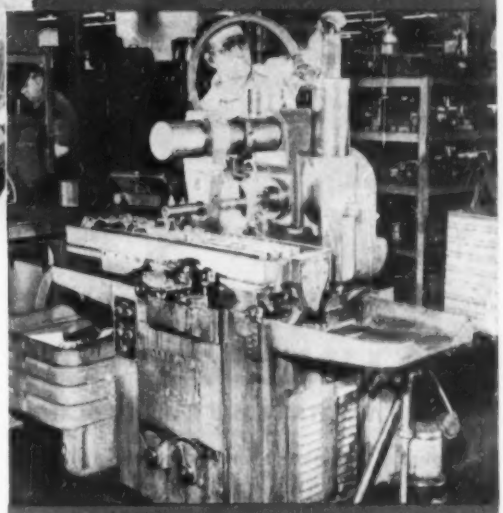
These new "Caterpillar" products are high-speed, long haul and high-capacity earthmoving machines built by Caterpillar Tractor Co., Peoria, Ill. The new units are a four-wheel Diesel tractor-wagon combination, the "Cat" DW20 Tractor with W20 Wagon; and the powerful two-wheel Diesel prime mover, the "Cat" DW21 equipped with the No. 21 Scraper.

The Kent-Owens Machine in the upper photo is milling bearing lock slots in connecting rods and caps. Due to the flexibility and ease in setting up Kent-Owens machines, the Caterpillar Company have found these machines can be easily adapted for a wide variety of operations. The machine in the lower photo is used for milling operation on compression release levers, clutch control levers, governor control levers and bell cranks. Write for Bulletins. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.

Call on

KENT-OWENS

for Milling Machines



Here are two Kent-Owens No. 2-20 Milling Machines in use at Caterpillar Tractor Co. These milling machines have 42" x 12" table, and 20" table travel.

SLOTTING & SIDE MILLING CUTTERS

BLADES ARE STANDARD CARBIDE BLANKS

Here's the most phenomenal milling cutter that ever touched its teeth to metal! Its ability is limited only by the stamina and power of your milling machines. More teeth per tool are available than any inserted-tooth milling cutter on the market. The blades are *standard carbide blanks* held with a simple taper wedge. The "S" is the most economical carbide cutter available — for blade replacement — for time-saving width and diameter adjustments—for minimum maintenance—for proven outstanding performance. Many stock sizes are available, and special cutters can be supplied for special needs.

Write for Details!

Lovejoy TOOL COMPANY, INC.

128 MAIN ST., SPRINGFIELD, VERMONT

sion within the company area. Business now has its eye on the ball and is learning the other point of view and how to reach it.

Management still has a selling job to do. They have to show the employee that business is not all profit. The working man hears a lot about the profit system. He is led to believe that all businesses make huge profits. He does not hear about the loss. They should learn that our economic system is a two-way lane—the profit and loss system. When a man goes in business or he invests his money, he is either successful or he fails. Almost half of all businesses are successful. The other half fail. A man has the freedom to be enterprising yet there is nothing free about it. Any management that takes the employee and helps him to learn some of the problems need not fear the results. The average employee wants to know things, he wants to express himself, he wants to criticize, he wants encouragement, wants to feel important just as you and I. He will react favorably to appreciation.

These things do not cost management one cent but accomplish good results. Employees produce more work when they learn a little about the place where they work, instead of finding it out through the grievance hearing. All executives tell you the door is always open to the employees, but no one ever goes through that door unless he has a grievance. If more people went through that door on a personal invitation there would be less grievances. In the final analysis give the employee a chance to express himself, spend more time in learning about individuals that make up the groups we supervise. Try to understand why people act the way they do.

A. E. Salmons
Philadelphia

•

If Al has learned that there is a prospect of improved business conditions in the plant where he is employed, why shouldn't he appear to be in good spirits?

As for the "Old Man," he knows that production is caused by demand for his goods, and sales by which he makes his profits, and, though it may be necessary to bid closely in order to make these sales, he knows, as well as anybody, that a small profit is better than none. While the profit upon a single unit is small, the aggregate profit will allow the firm to carry on, produce and sell the articles of their manufacture and so bring in the dough.

Now, as to telling the boys about

ECLIPSE-PIONEER *Foundries*

LEAD THE WAY TO BETTER CASTINGS

It is only natural that castings from the Eclipse-Pioneer Division Foundries are *better*, because every step in their manufacture is carried out by skilled craftsmen—each man an expert in his field and each field backed by more than 20 years experience. In addition to using the most modern machines, techniques and testing devices obtainable, the entire production line is conveyorized to assure rapid and economical service on all orders. If you plan to use aluminum and magnesium castings in your product, make it a point to consult Eclipse-Pioneer. Meanwhile, send for Eclipse-Pioneer's "Book of Facts."

ALL
Aluminum and Magnesium Alloys
Including the recently developed
Cerium and Zirconium Magnesium Alloys

PLEASE SEND ME THE ECLIPSE-PIONEER "BOOK OF FACTS" ON MAGNESIUM, ALUMINUM AND BRONZE CASTINGS.

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PLASTER MOLD CASTINGS

ECLIPSE-PIONEER DIVISION FOUNDRIES
BENDIX AVIATION CORPORATION
TETERBORO, N. J.

Bendix AVIATION CORPORATION

But all gear manufacturers agree that accuracy in a gear of this type is most difficult to achieve.

THE HAMILTON NO. 1
PRECISION GEAR HOBBER
ACHIEVES ACCURACY

CROWN GEARS, formed on this machine, will be found to have perfect contact on the pitch line throughout the entire length of the tooth.

FILE THESE FACTS IN YOUR MEMORY

The Hamilton No. 1 Gear Hobber forms *small, super-accurate* spur, spiral, bevel, worm, and face gears. It is of extra rigid construction, and embodies the **unique feature of independent selection of speed, feed, and indexing.**

Thus—the principle of this machine (hobbing) eliminates the possibility of indexing error. The accuracy of this machine is reckoned to .0002". The rigidity of this machine *maintains* accuracy and encourages heavy production loads. The principle of independent speed, feed, and indexing selection, embodied in this machine, cuts set-up time far below previously acknowledged minimums, and permits higher production on relatively soft materials without indexing change.

We will be glad to supply engineering information about the application of the Hamilton No. 1 machine to your particular job. **Also ask for our Bulletin H 1-49. It illustrates and explains the Hamilton No. 1 Gear Hobber in detail.**

DEALERSHIPS are still available in eight territories. Write for information.

THE Hamilton TOOL COMPANY
830 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

it, there are differences of opinion about it.

Take, for instance, James J. Hill, the empire builder of our north western states, who made no secret of his many business dealings in regard to the Great Northern Railway, whereas Diamond Jo Haliday, the man who controlled much of the shipping on the upper Mississippi River, kept everything in prospect under his bonnet. Then, after his deals matured and he was on the right side of them, he let his transactions leak out. Nothing was said, and, in this way, few if any of his off deals came to anyone's notice.

Both were very successful men of their period.

There was a time, in our business world, when all transactions were guarded by great secrecy by the brass and all employees were considered to be underlings who could not be trusted with the least detail.

This was true when each firm was attempting to stay ahead of its competitors, and they still do it.

Going back to the early times, a certain auto manufacturer imported a fine French car, took it apart, copied some of the details and put cars upon the market with these copied parts as part of their design.

Does anyone think that they published this fact? Not on your life.

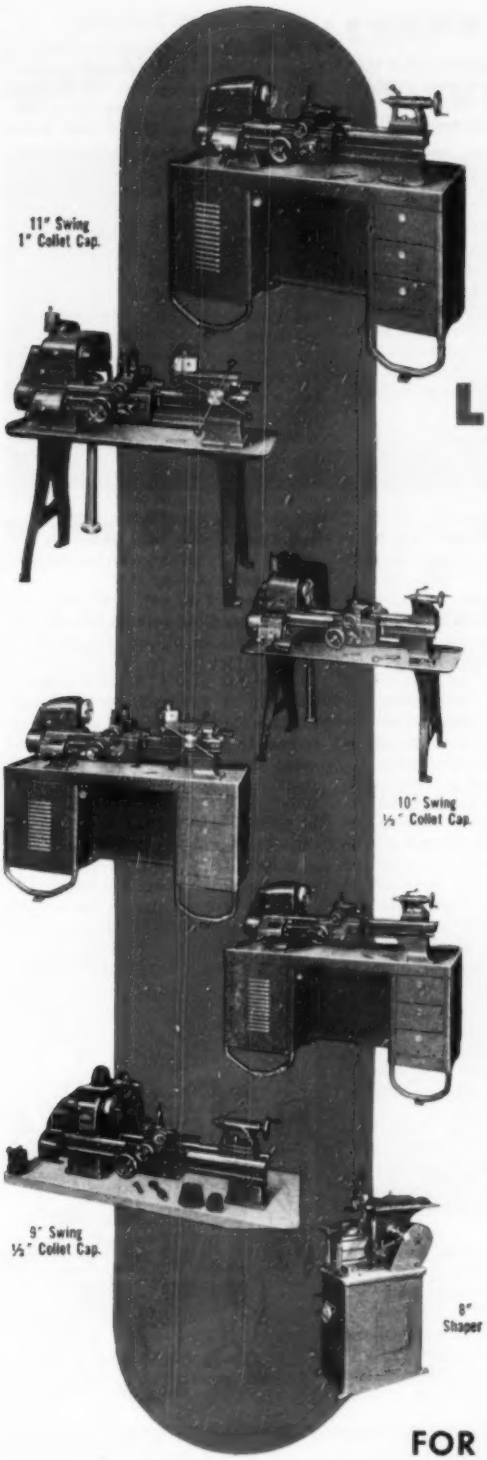
Gradually, there came a different attitude in the manufacturing world, and, today, the leaning towards secrecy is far less evident because most lines of product have become quite standardized and men of all grades of employment are often informed of much which formerly was strictly within the dominions of the directorate.

Men, of all walks of shop life, can learn through and by observation, as easily as anyone that when orders are not coming through in regular time, there is a slackness of demand and this state of conditions is the cause of apprehension upon the parts of the operators of machines and those in the assembly line. But let it be known that the prosperity of their employers is improving and the sun immediately shines over the horizon for them.

Today, men who are real men will appreciate being treated as such, and, while increases in wages are welcome, they know that the firm must also have its share of the incoming money if all are to prosper.

So let's allow each man to learn any legitimate news which may affect him in his occupation, for, generally speaking, all will benefit by it.

One of our largest corporations



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YOU CAN MAKE IT . . . . **FAST**

YOU CAN MAKE IT **FOR LESS**

ON A

LOGAN LATHE

The accuracy inherent in advanced Logan Lathe design permits holding precision tolerances on the production line as well as in the tool room. In large or small shops, wherever the need is for accelerated, accurate parts production and low cost operation, Logan Lathes can provide a practical, profitable solution. 45 accurate, versatile Logan Lathe models, 9″, 10″ and 11″ swing, ½″ and 1″ collet capacity, plus a complete line of lathe accessories assure year-in, year-out dependability. For full details on Logan Lathes and on the Logan 8″ Shaper, see your Logan Lathe dealer, or write to

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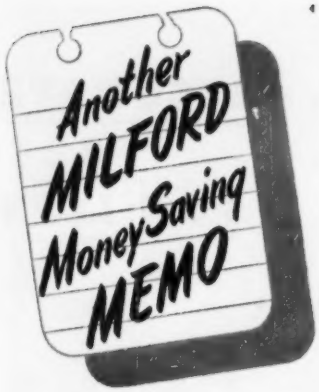

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28% MORE STRAIGHT CUTS
5% MORE SPEED }
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Recognized for years as top performers, MILFORD All-Hard REZISTORS are even better today! Severe break-down tests, conducted under identical cutting conditions, show today's All-Hard REZISTORS have 30% more endurance, deliver 28% more straight cuts, and are 5% faster than previous REZISTORS. M-2 high speed steel, a new development in metallurgy, enables REZISTORS to withstand friction of high speed cutting — adds hours to the blade's life. Specify these longer-lived time-saving, money-saving MILFORD blades. Select Industrial Distributors can serve you from stock.

This booklet tells you more. Get your copy, and literature on the complete line, from your MILFORD Distributor today. Or, write direct to the factory.

THE HENRY G. THOMPSON & SON CO.
Saw Specialists Exclusively For Over 70 Years
NEW HAVEN 5, CONNECTICUT, U.S.A.

Profile and Band Saw Blades — MILFORD — Rezistor & Duplex Hack Saw Blades

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seeks to divide its income into six parts.

These parts are salaries and wages, purchasing, improvements, maintenance and repairs, dividends and sinking fund. This is known to all employees.

This has worked out so well that they are leaders in their line and this corporation is one of the six largest businesses today.

They make a practice of nominally taking employees into their confidence and by this action they get the cooperation of all employees.

Employees, I believe, own about thirty-five percent of their stock.

F. H. Stebbins
Worcester, N. Y.

•

THE prosperity of a company should be, and I believe generally is of much interest to its employees.

In a certain sense they are partners; harmony is essential to both parties.

It is not reasonable to expect a liberal expression from an organization that not doing a prosperous business and the organizations that are prospering can well afford to pass along to their employees the state of affairs which should arouse a feeling of security in their job as well as prospects for the future.

Seasonal trends and general conditions affect business to quite an extent and usually to a limited extent are beyond the control of the organization. But the best managed concerns find ways to ease off to some extent the heights of peaks and the depth of valleys in business which should bring contentment to employees in realizing that their interests are recognized and are reasonably safeguarded.

I believe that the clearer the management keeps their employees in touch with their business, the closer their relations with one another will be.

Of course there are some who sway back and forth with every breeze that blows but such are not likely to be held very long anyway, and shifts make room for more stable employees.

If management keeps employees posted on matters coming up, fears are allayed of something being put over.

It is my belief that the general policy of the employers dealings with their employees should be open and free for the greatest success of both parties.

John Mark May
Watervliet, N. Y.

SHOT IN THE ARM

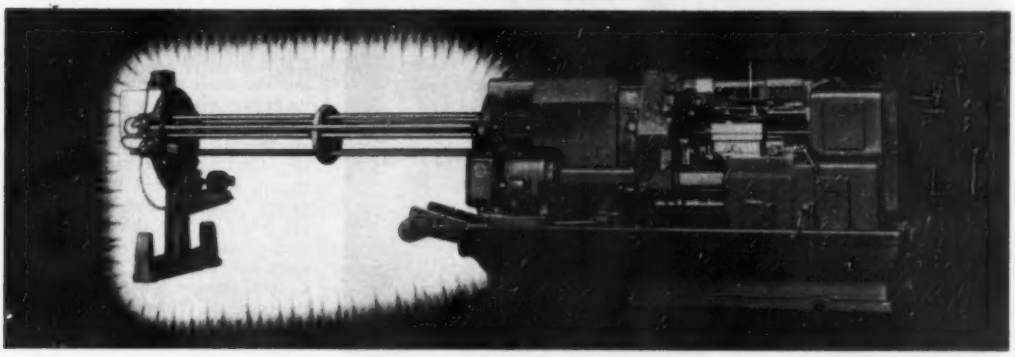
I HAD occasion a few years back to overhear what I considered a super de luxe needling session. The wielder of the hypodermic struck me as being a small-time Hitler and from what I gathered he held these meetings periodically which he felt as being necessary to his successful business.

To me, the nature of his delivery was very oppressive—not unlike the quality and intensity of old Snozzlepuss himself. How any self-respecting man could sit and take the searing blast was a wonder to me, but, they did and seemed to take it in stride. Here was a situation in which, because a man had the money, he thought he could raise particular hell with his employees simply because he considered a periodic injection necessary to keep them on their toes so that they would do their utmost. Where I would have told that fellow to go isn't a very cool place—job or no job. That's an extreme case which, fortunately, is very rare.

However, I do not look upon reasonable needling as being out of order. A foreman will impress upon his men the fact that he is on his toes if he gives his crew a "Saturday night" cleaning at intervals. We all know that we, as humans, are inclined to follow the law of Physics: unless acted upon by an outside force we shall eventually become inert. Whether this outside force is created by interest or coercion depends upon the effectiveness of the motion it creates. Obviously, interest in the job is the best of the two. If a foreman is alert he will constantly be on the lookout for anything that will hinder

". . . but you said I shouldn't wear anything that could get caught in the machinery!"

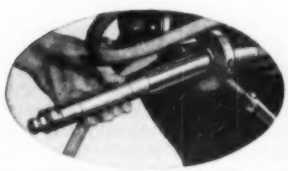
FEED OUT ANY LENGTH TO 16½" WITHOUT PUSHER MARKS!



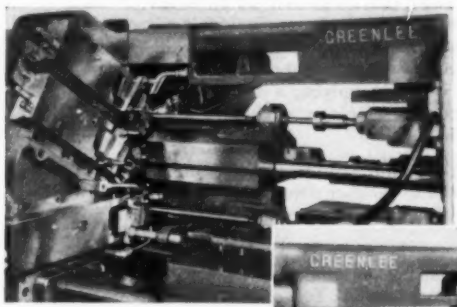
with GREENLEE AIR-FEED AUTOMATICS

Stock scoring — a necessary evil with conventional feed fingers — has often prevented certain jobs and materials from being handled on automatics, and has resulted in higher production costs. Now stock scoring can be completely eliminated by using Greenlee 1-inch 6-Spindle AIR-FEED Automatics which do away with the usual mechanical stock pusher arrangement. Instead of being gripped, the stock is moved forward smoothly and rapidly by an air-propelled piston in each stock reel tube.

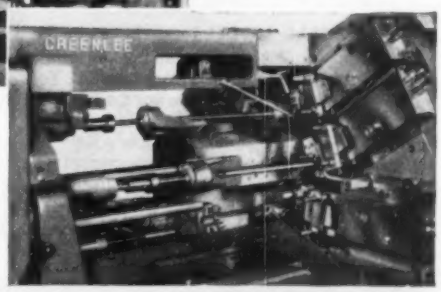
There are other advantages, too. Quicker set-ups are possible by the elimination of stock pusher changes for different size stock. Multiple feed-out arrangements can be easily adapted, requiring only the setting of stock stops and collet openers at the desired feed-out positions. With only the air behind it, the stock will feed out in *any* of five positions to wherever the stop is set. On simple cut-off and form jobs, this permits production of 2 or 3 pieces per cycle. Investigate Greenlee AIR-FEED for *your* shop.



Showing the piston inserted in the stock reel tube, to push the stock by air pressure. A suction pump returns the piston for reloading the tube.



Left, stations 1, 2, and 3 of a machine set up for multiple feed-out. The piece in this case is 16-3/32" long and requires only forming to a smaller diameter at one end. Live bushings ahead of the stops are used to prevent whipping.



Right, rear view of the same machine as above, showing positions 4, 5, and 6. The stock feeds out at positions 1, 3, and 5 and is formed. Cut-offs are at positions 2, 4, and 6 and chutes (not shown) are rigged to slide finished pieces away from the working area.

PRODUCTION MACHINERY

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STANDARD MODEL (at bottom of illustration) can be shipped immediately from stock in number sizes of 1/16", 3/32", 1/8" and 3/16". Prompt shipment on other sizes.

SPECIAL MODELS can be made in combination with dies (top of illustration) and to any other requirements including embossing and debossing heads. For prices write Noble & Westbrook Manufacturing Co., 17 Westbrook Street, East Hartford 8, Conn.

production. He can't let any of his men get away with "murder" and some certainly will if he lets them. I can't see where a man would take exception to his foreman calling his attention to something he knows is contrary to the best interest of the shop. I recall many a time when my E.M.F. dropped and a recharging by the boss made my wheels hum a little better. Oh, I was a little put out at first, but a little reasoning made me see the justice of the "bull's" complaint and the vinegar in my system soon turned to sugar. The present era calls for foremen who are wider awake than ever before simply because the leaks which were mere dribbles in the past are really forceful streams today on account of the pressure caused by the increase in labor cost.

Just because there are a few nonthinking individuals who complain about reprimands, it does not mean that the great majority don't see the justice behind them. Needling, to my way of thinking, is a means of keeping the shop up to its highest possible efficiency. From gong to gong, in our system of Free Enterprise, it's a case of up-an'-at-'em or, economically, we'll be down for the count. A shop executive who is wide awake will merit the respect of his men and they'll be happy to cooperate in his efforts. So, Mr. Foreman, make it a practice to give yourself a little shot in the arm each morning so that you'll be awake to the necessary needling to be done in your department.

John Homewood
Ontario, Calif.

•

ADMINISTRATION of the needle is a ticklish business; there are those who can use the needle effectively and others who dismally fail if and when they try it. A peculiar thing about this is that some *deserve* success in wielding the needle, while others deserve to fail, and that success or the lack of it over any appreciable period of time runs pretty well parallel to what a man deserves. It is definitely wrong to needle a man in the sense of driving him too hard for his own good. It is right in some cases to needle him into a consciousness of the fact that he is absolutely expected to do a good day's work, and that so long as he does so, he may expect that degree of job security and remuneration commensurate with his efforts.

Ed's idea of deliberately *hunting* for a needling weapon in the case of each individual, therefore, is fundamentally wrong. If he persists in it,

he will without question lose the good will of his men. The rebellion he will unwittingly inculcate within their minds will inevitably have its reaction, and may bob up to cause him much trouble at a time when he least expects it. Regardless of the fact that some few men do not appreciate fair treatment, most of them do, and the man who is needled as an actual slave-driving tactic is sure to resent it.

There is perhaps only one way in which a foreman can positively guard against the temptation of using cheap artifices in this connection, and that is to cultivate a genuine interest in his men. The plain fact is that men who have a sense of well-being on the job, and with it have a belief that their superiors are really interested in their well-being as well as in that of the organization itself, actually have a greater natural ability to do their work and do it well. The old fear psychology which was considered good management by some industrialists in days gone by has been proven to be flagrant *mis*-management. A man who must be frightened into doing a good day's work should be dismissed, and a man who is willing and able to do a good day's work will do less in the long run through fear.

Institution of a definite needling program without regard to actual interests of those being needled, therefore, inevitably brings forth depreciation of departmental morale. What is true of men in general and departments in general, however, may not be true of an occasional phlegmatic individual. In any department, if one were to select the most intelligent and high-strung man in the department (it is a fact that highly-intelligent men can have their nerves and morale injured more easily than those lower in intelligence in most instance) and theoretically set him alongside the most suggish individual, one would not need a very deep understanding of human nature to realize there is an actual *constitutional* difference between them.

A given amount of needling might actually be for the good of the slower man, while it would be mental cruelty for the other man. The actual well being of each, however, in its proper inter-relationship to the good of the department and the organization, should be the goal of the foreman in every case. Thus it may be needful to do a bit of driving on occasion, but in the main, the foreman should consider himself a leader and not a driver. In it all, he should steadfastly remember that a word of appreciation about what a man *has* done well will often accomplish more

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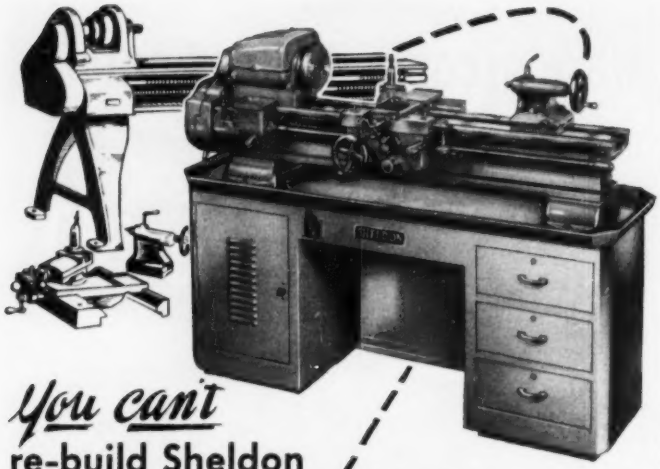

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•

CACHE OR CONFESS?

CACHE or confess; to acknowledge one's errors, or to find another piece of material, without being sure of its grade, and surreptitiously make another part? Have we forgotten the work of Dr. Taylor and others who tried to emphasize the need for the most nearly complete knowledge possible of all that is connected with manufacture: the materials used, control, grade, and amount?

In well-run works, in the planning for production, the form, grade, size and amount of material required for pre-specified size of batch is laid down and, quite often, issued from store to "Progress Dept." or "Work Depot" in accordance with program and scheduled requirements as a matter of routine. In such a works, confession would be hardly necessary while detection would be unavoidable. The question would be dealt with as a matter of routine. To cache would be but to make an offense, whereas before, there was only an error of judgment or workmanship.

Always, however, it is desirable to maintain a due sense of perspective. A mistake is not a crime, although often treated as though it were. On one occasion, the writer told a director that a mistake made in the shops seemed to be a crime, but if made in the offices was treated almost as an act of God. In this works, a casting for a "rush"job was scrapped and the writer was advised to give the man hell. On learning the name of the man, it was realized the culprit was one of the best and most careful of men. Inquiring when he had scrapped a job before, the answer was "I believe it was the year before last." The foreman confirmed this. The man realized the seriousness of the position; the only hell needed he already had, and anything in the form of further punishment would have defeated the end in view.

P. E. James
Lindum, England

Pro and Con

Recently, T. P. McGonigle, a regular but anonymous contributor to "The Valve," employee house organ at the Chapman Valve Manufacturing Com-

pany, Indian Orchard, Mass., came forth with this plaint:

ON USING KENNAMETAL

O, dear dead days beyond recall when,
happy as a linnet,
We milled a valve's component parts
at thirty revs a minute;
Not dreaming of the shocking sight
the future had in store:
This cutter travelling at two hundred
r.p.m. or more!

These red-hot chips might fry an egg,
or even boil a kettle!
O, blessings on the blighter who
invented Kennametal!
We never were enamored of
the art of making friends
On the mass-production basis Dale
Carnegie recommends;
But we are no misanthropist—
we solemnly can place
Our hand upon our heart and swear
we love the human race.
But there's a guy at large to-day
whose hash we'd like to settle—
O, blessings on the blighter who
invented Kennametal!
—T. P. McGonigle

Shortly thereafter, there came this reply:

Yes, my friend, this selfsame writer
Of these verses is the blighter
Who tried so hard to make that cutter
Milling steel like so much butter.

It was really very long ago
When I thought we'd have to show
That the Yanks could not be beat
By the Germans seeking our defeat.

Long ago in nineteen twenty-eight
I knew well the sorry fate
Of a country lacking tools
Ruled by thoughtless cherry fools.

Ten long years I tried and tried,
Suffered loss in time and pride,
'Cause my cutters chipped and broke
Made by this unhappy bloke.

Then at last in thirty-eight
Came the thought that put me straight,
How to win the crystals pure
Making carbide to endure.

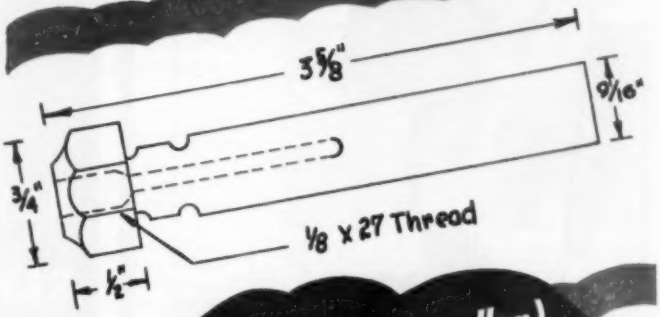
Many months of weary test
Showed at last it was the best.
Now my friends in every shop
Know my work was not a flop.

Do you really think it wise
Such inventions to despise?
Yankees never will be slaves
If each one of us behaves.

Acts with vigor to increase
Things we need in war or peace,
Trades them freely to his brother,
Laughs and jokes with one another.

Thanks again from this here blighter
Like yourself a verses writer.
Grind those cutters with all caution,
So they do not chip too often!
—*Philip M. McKenna,*
President, Kennametal, Inc.

How to trade *Pennies* for *Dollars* . . .



10c more (per gallon) invested in cutting fluids SAVES $50 PER DAY PER MACHINE!

PRICE alone makes no profit. The drawing above illustrates a shackle bolt which is drilled and tapped on a New Britain Automatic. Using an inferior cutting oil 12 taps were used up every 2½ days—12 pieces per tap. A change to Stuart's SPEEDKUT M on a 2½ day run showed 530 pieces per tap—no taps used up. The saving? Taking into full account the pennies-higher price of Stuart *quality* oil: $50 per day per machine!

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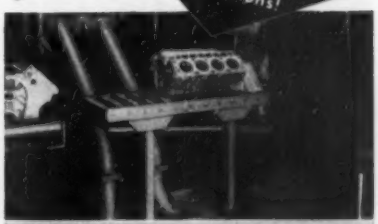
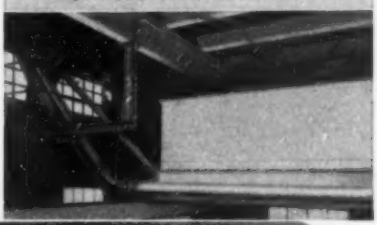
Houdaille Conveyor's automatic loading and continuous materials transport will handle any solid or fibrous material (chips, abrasive sludge, scale, etc.) which will settle to the bottom of a tank or hopper. Many metal working plants have saved substantially on production costs . . . labor, maintenance, down-time, etc. . . . by installing one or more Houdaille Conveyor systems. Look at these important Houdaille advantages:

● Eliminates costly manual handling methods. ● Operates continuously or intermittently as needed without shutting down productive machinery ● Readily adaptable to almost any space or traverse requirement ● Dependable, trouble-free operation . . . requires little or no maintenance attention . . . quickly pays for itself out of savings.



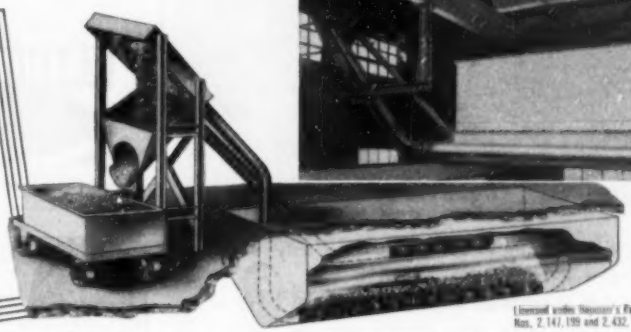
ABOVE: Houdaille Conveyor for continuous metal chip removal at large motor car plant paid for itself in one year.

BELOW: Houdaille Conveyor for removal of sludge in dust collecting system, Minneapolis Electric Steel Castings Company, saves $1,092 annually.



Ideal for Removal of:

- Cast Iron Dust and Chips
- Aluminum Dust and Chips
- Abrasive Sludge
- Scale resulting from quenching, metal cleaning, steel rolling, brass rolling, aluminum rolling, wire drawing
- Material from Dust Collectors
- Plastic Powders
- Many Others



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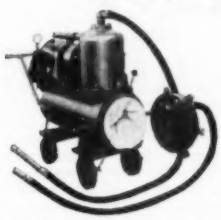

Houdaille Mobile Coolant Filter

This mobile one-man unit can serve any number of machine tools . . . will clean up an individual machine sump in less than ten minutes. Coolant is drawn through a close-woven cloth bag which removes solid particles such as dirt, chips and abrasives. Clean coolant is returned to the sump.

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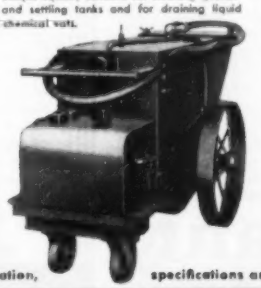
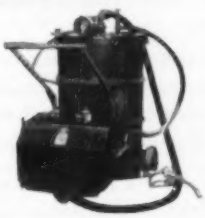
A time saving, one-man unit for removal of cutting oils or coolants contaminated with abrasive, grindings, chips and other solids from machine tool sumps. Equally suitable for cleaning quenching and settling tanks and for draining liquid and chemical vats.





Houdaille Oil Dispensing Unit

This handy truck is designed primarily to dispense oil from drums to machine tool reservoirs or sumps. May also be used to transfer oil between drums or to remove oils or coolants from tanks for dispensing to machine tool sumps. One man can easily operate the unit and do a fast, clean oil handling job at considerable saving in time and labor.

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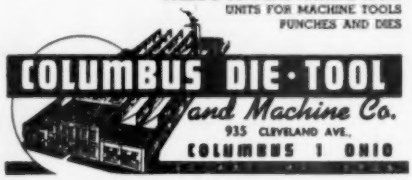

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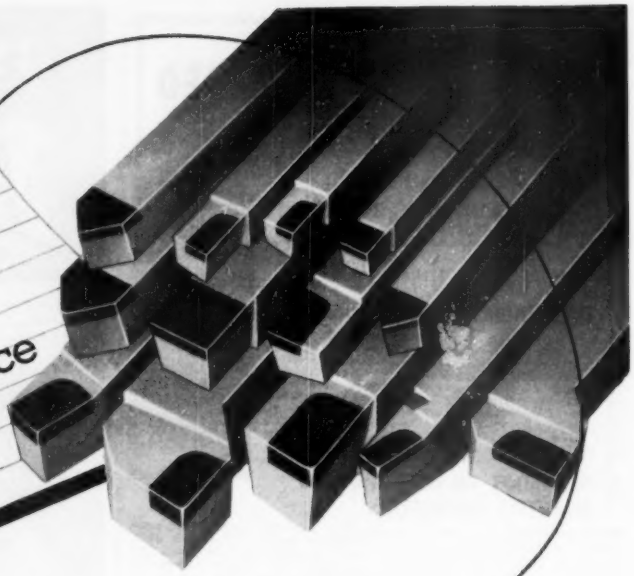

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Tie to Talide Tools and Tips for all-around service. Call our nearest application engineer or write to us at Youngstown and outline your problem.

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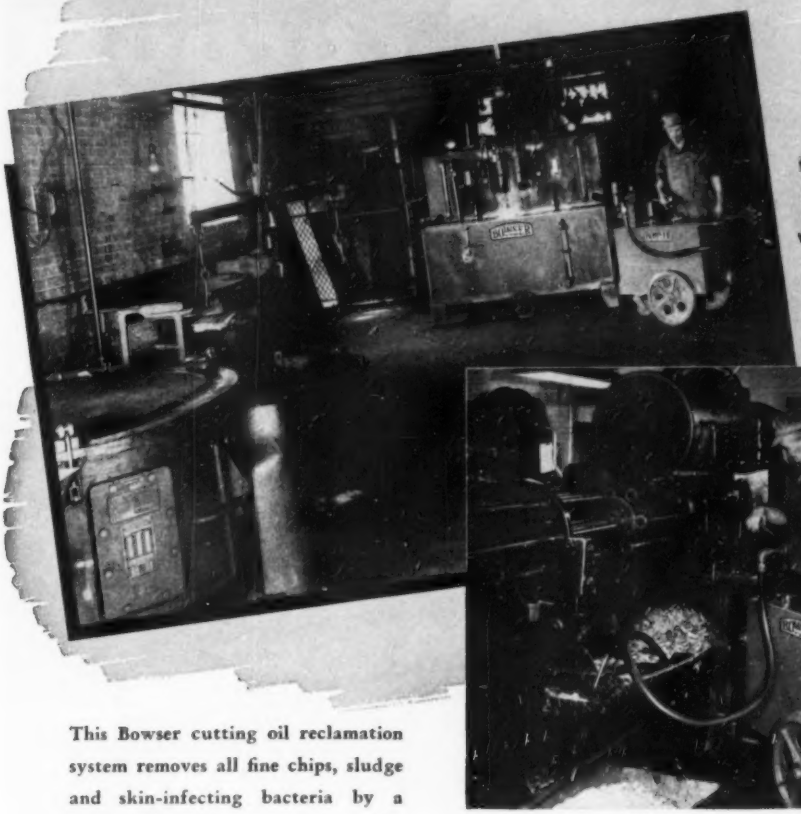
YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*
CUTTING TOOLS · DRAWING DIES · WEAR RESISTANT PARTS

RECLAIM YOUR CUTTING OILS



Pumping filtered oil into wheel tank

This Bowser cutting oil reclamation system removes all fine chips, sludge and skin-infecting bacteria by a combination of heat sterilization, precipitation and filtration. It also provides storage for both dirty and reclaimed cutting oil.

Hundreds of metalworking plants are using this equipment and operating it continuously to reclaim the dirty oil extracted from chips as well as oils removed from machine sumps.

Removing used cutting oil from machine sump

SAVES MONEY

In oil savings alone this Bowser system usually pays for its investment in only a few months. The *extra production dividends* you get are longer tool life, freedom from workers' skin infections and better housekeeping. It helps to solve disposal problems, too.

A SYSTEM FOR EVERY NEED

For those cutting operations requiring full, continuous filtration on either individual machines or large groups . . . there's a Bowser cutting oil or coolant filter ideally suited for the job.

BOWSER, INC.

1348 Creighton Ave.

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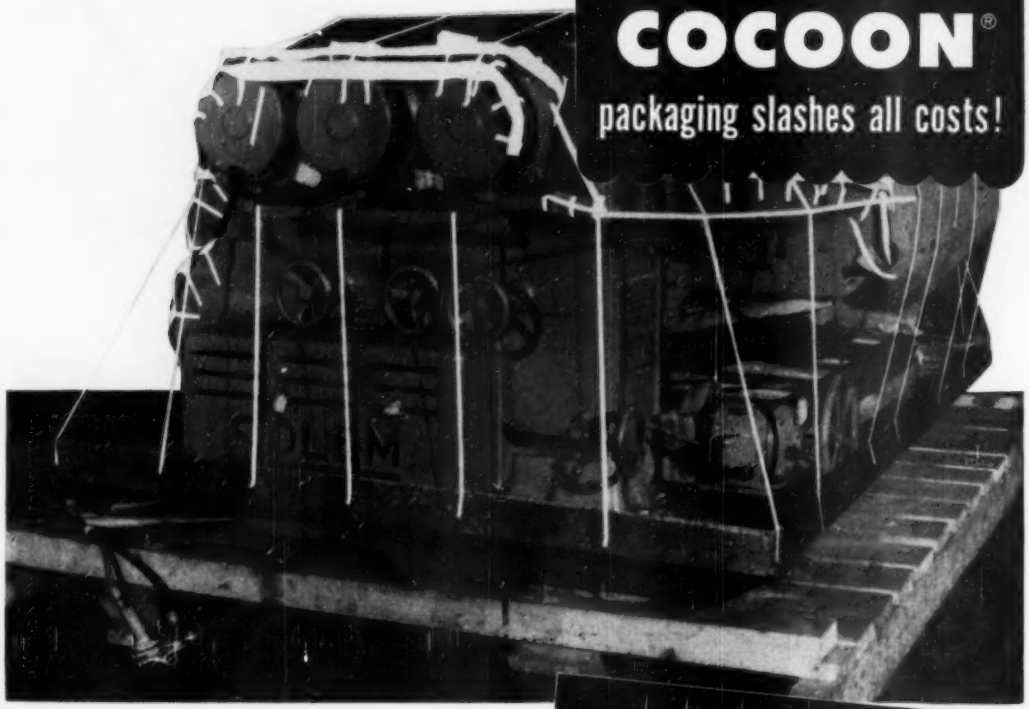
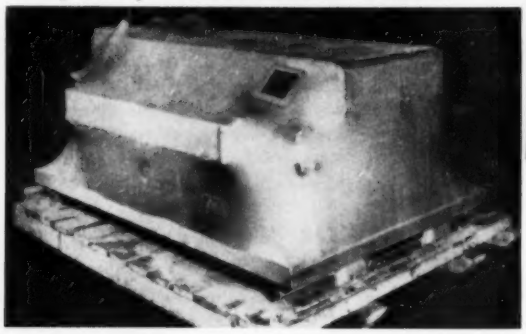
PIONEERS IN INDUSTRIAL OIL RECLAMATION

Spray it on!
COCOON®
packaging slashes all costs!



1. PACKAGING PROBLEM! This set-up 3-drum sander presented a tough problem in packaging. It had to be prepared for overseas shipment to a tropical country by rail and by ship. The first step was to set the sander in a sheet metal pan, and bolt the sander to a wooden skid. (The edges of the metal pan serve as the foundation of the COCOON coating). Next step was to form a grid of tape around the machine, as shown here.



2. FAST, EASY, ECONOMICAL! COCOON is first sprayed on to form a coarse webbing across the tape grid. Cobwebs of COCOON are sprayed until a film is formed strong enough to withstand spraying of successive coats. Spraying COCOON does not require special equipment or special skills—your own men can be easily shown how to spray COCOON with standard spray outfits.

3. COMPLETE PROTECTION! Final coats of COCOON are sprayed over the cobwebbing. Colors may be added to the spray material to facilitate even application of successive coats. Air holes and windows are sealed and dessicants such as silica gel are placed inside the COCOON package to absorb trapped moisture. For protection from the sun, an aluminum top coat can be put on, or a gilsonite base coat can be used for long storage periods.

COCOON is the sprayable plastic used by the Army for guns and machinery; by the Navy for storage of ships; and by the Air Force for the now-famous wrap-up of B-29's. COCOON is a famous WHIZ product of—

Whiz

R. M. HOLLINGSHEAD CORPORATION
Camden 2, New Jersey
Canadian Offices: Toronto · Warehouses: Dallas, San Francisco, Chicago

COCOON®
GIVES MACHINERY BEST PROTECTION EVER!

The sander in its COCOON package reached its South American destination with "not a bit of rust on it," says the letter below. COCOON gives this kind of complete packaging protection—the best ever developed for low-cost practical use. COCOON shuts out moisture, acids, oils, grease, mildew, molds and insulates against sunlight. COCOON withstands extreme heat and cold, and is not inflammable.

You can get full technical details about COCOON and its application to your needs by writing today! We'll also train your men to apply COCOON in our Camden spray booths. Investigate COCOON now!

SOLEM

SOLEM MACHINE COMPANY

July 1, 1947

R. M. Hollingshead Corporation
Camden, New Jersey

Attention: Mr. Murray Gibson
Coatings Division

Gentlemen:

Thank you very much for your letter of June 26th.

Mr. Solem has just returned from a trip to South America, including Brazil. The Solem sander left for Brazil on an open flat car. We understand that when the machine left New York in February, the package was stored on the deck of the ship instead of in the hold. Mr. Solem visited this customer's plant at Belo Horizonte within the last month, and he reports that the machine came through to destination in perfect shape. There was not a bit of rust on it. The package was handled by truck from the Atlantic seaboard after the shipment got to Brazil.

We now have several orders for export, a number of which includes specifications for your "COCOON" packaging, and we trust these will go through to destination with equal success.

Yours very truly,

SOLEM MACHINE COMPANY

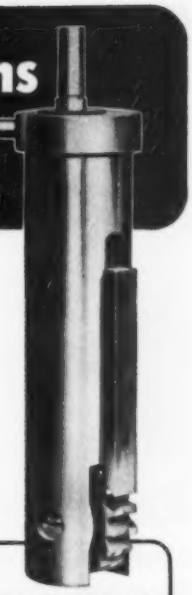
Vice-President

COCOON

Whiz

R. M. HOLLINGSHEAD CORPORATION
LEADER IN MAINTENANCE CHEMICALS
Camden 2, New Jersey

10 Good Reasons
why YOU should use NATIONAL Keyseating Millers on your next job



They will mill keyseats:

- in one cut.
- in offset holes.
- that are straight.
- with parallel sides.
- partly through holes.
- for interchangeable parts.
- without clamping the work.
- of standard width and depth.
- in holes that are closed at one end.
- where keyseating machine can't reach.

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for Catalog No. 16
complete, handy size

Started with one...

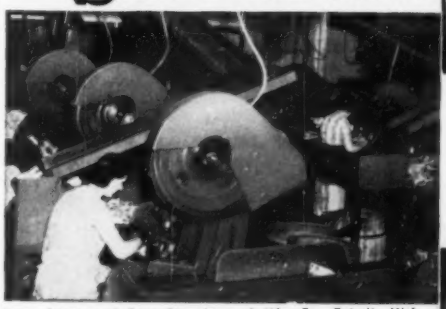

Photo Courtesy of Ferro Stamping and Mfg. Co., Detroit, Mich.

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PRESS-RITE POWER PRESS

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50
IN OPERATION!

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PRESS-RITE PRESS CONSTRUCTION is rugged for longer harder service. Strong Uni-cast frame, four point sliding key clutch, automatic cam actuated brake, and triple lubricated "V" ways all reduce maintenance and help keep costs down.

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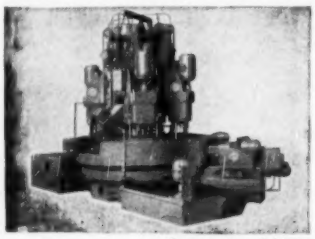
NEW! Mechanical POWER HEADS...

Help Maintain Production of 166 Pieces Per Hour — Lower Maintenance Costs

When you need high production with low unit and maintenance costs, consider the advantages of Roto-Matics. In this case the Roto-Matic is a station-type machine with indexing table. Drilling and reaming both suspension and king pin holes in front suspension support arms are performed at the rate of 83 pairs or 166 pieces per hour.



General view of drilling and reaming machine equipped with new Roto-Matic mechanical power heads.

An outstanding new Davis and Thompson development incorporated in the design of this machine are the Roto-Matic mechanical, electrical power heads operated by screw feeds. Included among the safety features are overload release clutches on the feed screws. Six heads are used, three vertical and three horizontal. Lower maintenance costs are obtained through elimination of excessive servicing.

Machines similar to this can be designed to handle dissimilar operations in the same parts or one operation on continuous production. Investigate the profitable applications of Roto-Matics.

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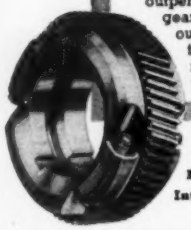

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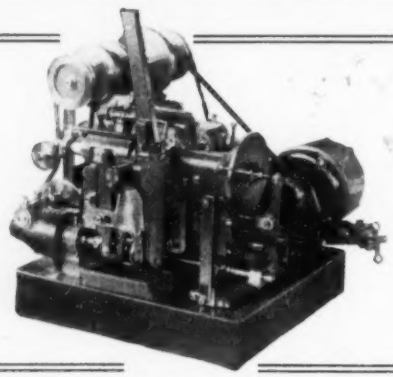

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• Gear cutters and reamers

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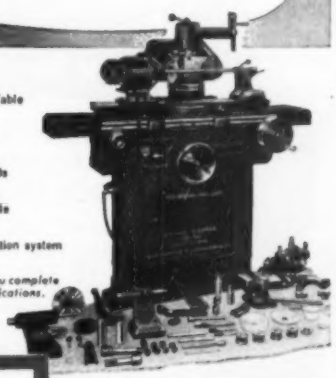

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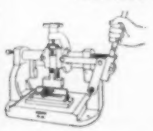

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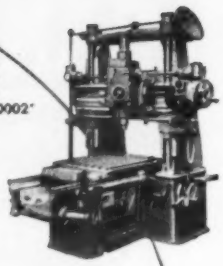
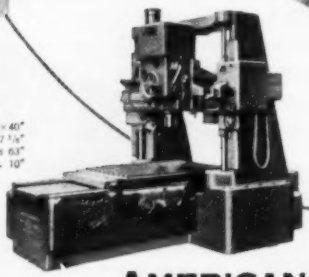
Working range . . . . . 40" × 28"
Table top to spindle end . . 28 1/4"
Free space between uprights 39 3/4"
Boring capacity . . . . . 9"
Guaranteed accuracy: .0002"



No. 2H
Working range . . . . 16" × 10"
Table top to spindle end . . . 19"
From spindle axis to column 13 7/16"
Boring capacity . . . . . 1 5/16"
Guaranteed accuracy: .0001"

SIP

Hydroptic-7
Working range . . . . 55" × 40"
Table top to spindle end . 37 7/16"
Free space between uprights 63"
Boring capacity . . . . . 10"
Guaranteed accuracy: .0002"



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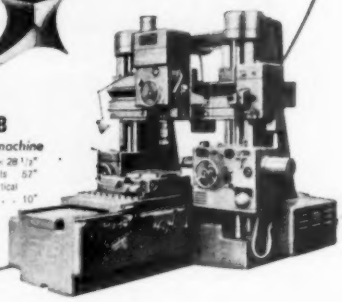
Three-coordinate machine
Working range 55" × 40" × 28 1/2"
Free space between uprights . 63"
Boring capacity of both vertical and horizontal spindles . . . 10"
Guaranteed accuracy: .0002"



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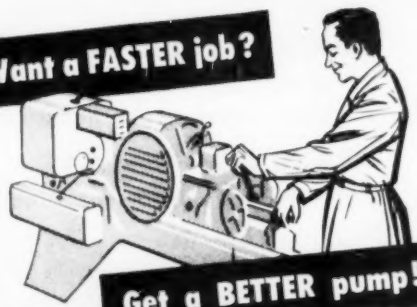

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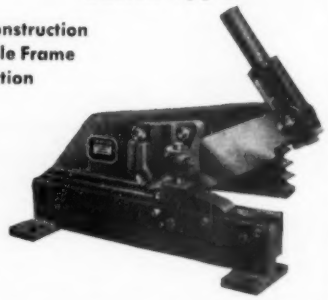

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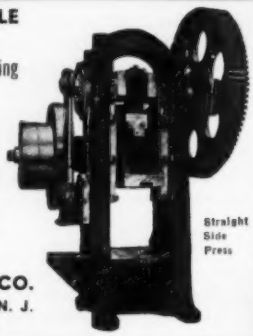

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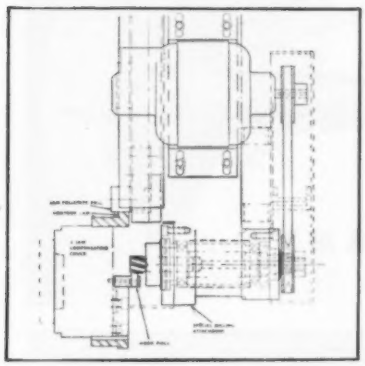
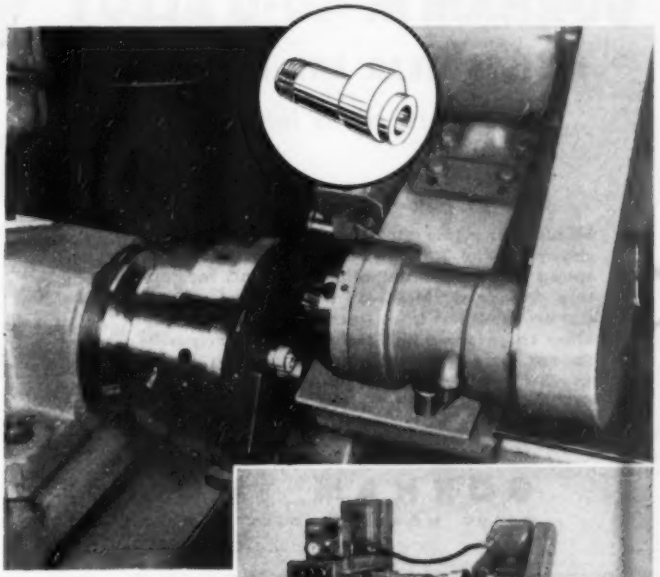
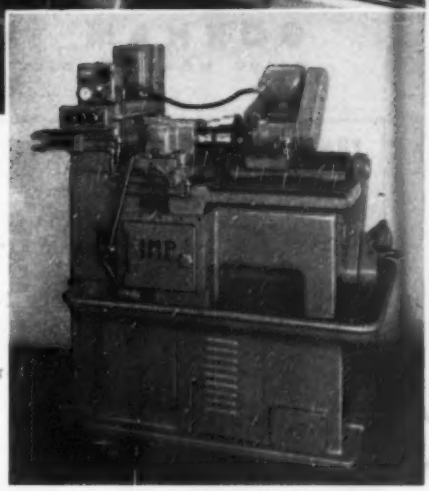
PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

SPECIAL MILLING ATTACHMENT ON *Lo-swing* IMP CONTOUR MILLS PLASTIC CAMS





Close-up view, with chip shield removed, showing work in chuck.



Lo-swing IMP equipped with Special Milling Attachment. Chip shield removed.

Problem: To finish machine constant diameter cams of molded plastic material on a mass production basis. Two conditions had a direct bearing on the machining method employed on this job; (a) a very smooth finish was required and the cam contour had to be accurate within very close tolerances; (b) the shape of the cam made turning impractical. Consequently, a milling operation was decided upon.

Solution: The *Lo-Swing* IMP Lathe selected for this job was equipped with a special Milling Attachment, the movement of which is controlled by a master cam fitted to the outside of a compensating three-jaw chuck mounted on a low speed revolving headstock spindle. The work piece is carried on a centering plug fitted to the chuck body and driven by the compensating jaws, thus assuring accuracy between the bore of the part and the profile of the cam.

The machine cycle is completely automatic. The operator places the work in the air operated chuck and throws the starting lever. The headstock spindle starts to revolve; the milling cutter automatically advances to cutting position and the work piece is machined. At the end of the cycle, the milling cutter is automatically retracted to the starting position and the machine stops, ready for unloading and reloading. Contact between the master cam and the cam follower roll on the milling attachment slide is maintained by spring tension.

Seneca Falls engineers welcome inquiries involving difficult and unusual machining problems.

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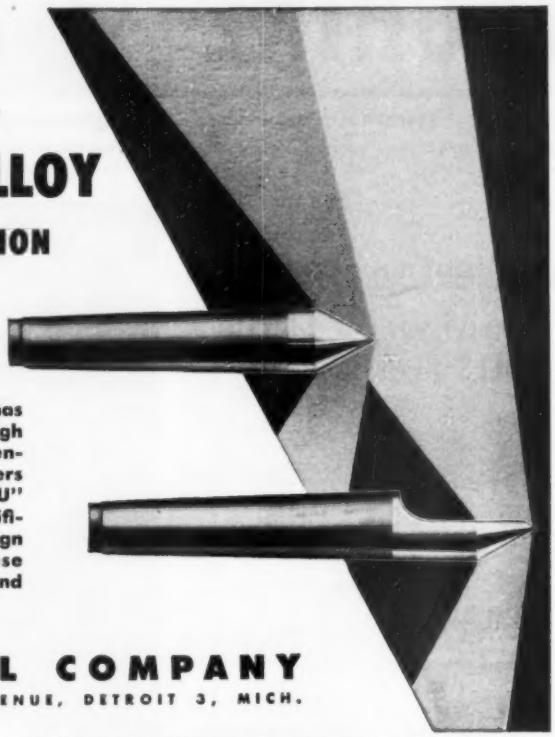

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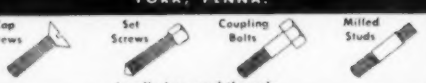

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See Page 3

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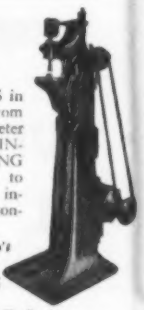

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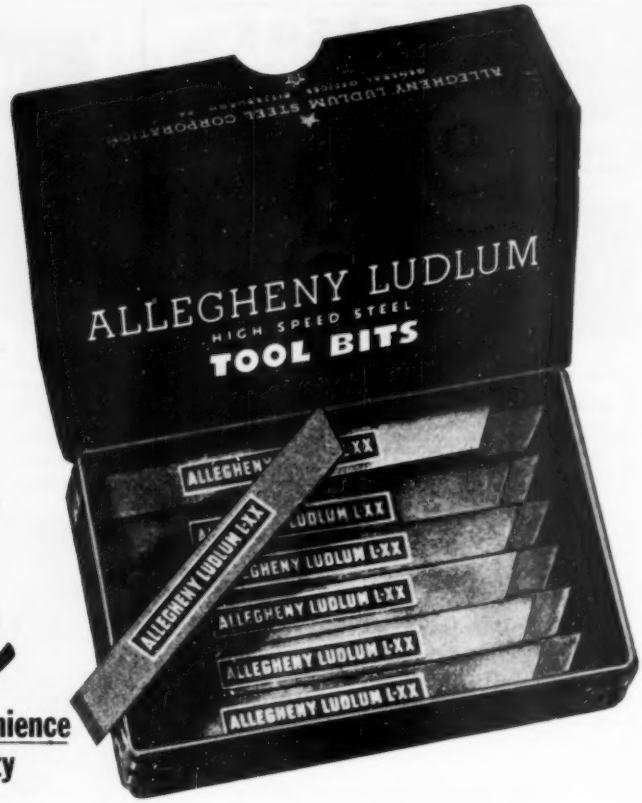

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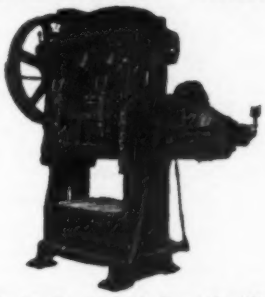

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DOWN MOVING RAM, WITHOUT POWER UNIT

Mesta	750	42"	80"	44 x 44
Chambersburg	300	10"	27"	22 x 36
Southwark	350	42"	78"	28 x 48
Southwark	550	23"	48½"	42 x 32

UP MOVING RAM PRESSES

Southwark	600	20"	27" to 48"	34 x 24
Waterbury Farrel	800	6½"	28"	22 x 24
Birdsboro	800	20"	30" to 48"	40 x 32
Watson Stillman	300	12"	21"	24 x 20
Watson Stillman	300	12"	19"	36 x 20
HPM	180	15"	14½"	30 x 30
Dunning & Boschert Molding Press	300	12"	38"	24 x 32 Mold
Stokes Molding Press and Pump	200	8"	30"	26 x 26
Elmes—With Elec. Plates	50	4"	12"	18 x 18
Stewart Bolling	85	10"	19"	20 x 20

WHEEL PRESSES

NILES — 600 ton 96" 500 ton — 48"; 300 ton — 48.

INJECTION MOLDERS

ACCUMULATORS

Mfr.	Size	Pounds
HPM	4" x 9"	2000
General Electric	15" x 11'	400
Watson Stillman (12 gal) Hydr. Pres.	42 x 9 x 48"	3000

Lodge & Shipley 16 x 78" T.A., Collets, etc., 20"x54" 24 speed G.H.
Monarch 10"x20" EE.
Monarch 12x30" Dble. Compound, 18", 12"x30" CKE
Rivett 608 QCG, TA. Precision
South Bend Q.C.G., 18"x6', 10"x4'

MILLS, PRODUCTION
Brown & Sharpe, No. 000, 12, 21
Cincinnati No. 2-18 Mfg., 50-96 hydromatic
Kent Owens IV, 1-3
U. S. Multimiller, 1 & 2 Spindles.
Sundstrand 60 Rigidmills

MILLS, PLAIN AND UNIVERSAL
B. & S. No. 2A Univ.
Cincinnati No. 3 Plain, 2M Plain
Cincinnati No. 2MH Univ., H.S.
Milwaukee 2HL, 2H Univ., H.S.
Milwaukee No. 2H Plain, 2 HL
Van Norman Duplex, 20.

MILLS, VERTICAL
Brown & Sharpe No. 2 Standard.
Cincinnati No. 3 Hi-Speed Dial Type.
Cincinnati No. 4, Hi-Power.
Gorton No. 8½ D Profiler
Morey No. 12M Profiler 2 sp.
Sipp MPS Jig Borer
Fosdick #30 Jig Borer.
Pratt & Whitney #2 Jig Borer

PLANERS
Detrick & Harvey 48"x48"x18' open side 2 Rail heads, 1 side head.
Hamilton 30"x30"x10' double housing.
Hamilton 36"x36"x22' double housing.

PRESSES
Bliss No. 18, 19, 20, 21, OBI.
Bliss No. 304A, 4" Str. 23"x24" bed, S.S.
Bliss No. 643B, 650 Hi-Production, 58, 62, 62A, 162.
Bliss No. 4½ Double Action Cam
Colton Tablet Presses.
Gen. Flexible Screw Press.
Z. & H. 30 Ton, O.B.I.
Stokes Tablet Presses, Model R & T, DDH.
V&O #01

TURRET LATHES
Acme No. 6 W Bar and Chuck, Acme Fox.
Bardons & Oliver No. 3, 1⅛" cap., No. 5, Chuck.
Brown & Sharpe 2F
Foster No. 3B.
Gisholt No. 4, Bar and Chuck, 2L, Saddle Type
Jones & Lamson #5 Univ. Preselector head, PRT
Warner & Swasey #5 Preselector
Warner & Swasey No. 4A 8" Cap.

MISCELLANEOUS
Band Saw; DoAll 36" Zephyr, Tannewitz No. 36M.
Bending Roll: Webb ¼"x5', BR-3
Centering Machine: Sundstrand.
Comparator: J & L 14" pedestal & bench.
Die Casting Machine DCMT
Hacksaw: Marvel Nos. 6 and 6A, 9A Automatic Feed.
Marking Machine: Noble & Westbrook
Notching Press: Ferracute C82.
Pin Machine: Nilson.
Profilers: Cinn. 3&9" 4 Sp., Morey 12M
Shaper: Cinn. 24" Universal. Sheldon 12" Brand New.
Rotary Shear: Quickwork 3/16" Cap. 36" throat circle cutting attach.
Honer: Micromatic Hydrohoner, Sunnen.
Keyseaters: Mitts & Merrill, Baker, Burr, Davis.
Lappers: Ultralap.
Rivet Hammers: Hi Speed.
Toolmakers Microscope: Gaertner, Bausch & Lomb, Leitz
Tapper: Bakewell #1, #2, Haskins No. 3C, 3 Cam, Globe.
Welders: Spot & Seam: Thompson, Taylor, Winfield.
Wrapping Roll: #¼ Buffalo

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MONA

LATEST TYPE MACHINE TOOLS

BORING MILLS—Horizontal
NILES-BEMENT-POND 5", 8" bar, Floor Type, M.D.
SELLERS 5" Bar Table Type, latest type

BORING MILLS—Vertical
BULLARD 24", 36" Vert. Turret "Spiral Drive" High Speed, Latest Type
NILES 100", 2 swivel heads, Rapid Traverse, AC M.D.

DRILLS—Miscellaneous
BARNES H-3 "Hydram" Hydraulic, 3" capacity—for inverted drilling, Latest Type
NATCO #4AL Multiple, 30 spindles, Hyd. Latest Type

GEAR CUTTING EQUIPMENT
BILGRAM 6" and 16" cap., Bevel Gear Gen., M.D.
FELLOWS Model 6L, 6LA, 6S2, 7A, 71S, 71S2, 72, 725, 77 High Speed Gear, Shaper, Latest Type
GLEASON #14 Hypoid Spiral Grinder, Latest Type
GLEASON 3", 12" straight bevel generator, latest type
GLEASON 24", 37", 77", 96" Straight and Bevel Gear Planer, Motor drive
GOULD & EBERHARDT 12H Hobber, DIFF., Latest
GOULD & EBERHARDT 18H Hobber, Motor Drive
GOULD & EBERHARDT 96H Hobber, with diff. M.D.
NEWARK #5, 72" Hobber with Infeed and Diff. M.D.
PRATT & WHITNEY 10" Grinder, hyd., latest

GRINDERS—Cyl.—Plain & Univ.
BROWN & SHARPE #1, 2, 3, 4, Universal, Latest
BROWN & SHARPE #5 Plain, 5 & 12, Latest Type
CINCINNATI 16"x36" Model E.R., Univ., Latest Type
LANDIS 4x12, Type H, Plain Hyd., Latest Type
LANDIS 6"x18" Type C Plain, Hyd., Latest Type
LANDIS 20"x120" Plain Roll, Motor Drive
NORTON 10"x72" Type C, Plain, Latest Type
NORTON 17"x72" Centers Crankpin Grinder, Hyd., Latest type

GRINDERS—Miscellaneous
BARBER COLMAN #2, Hob Sharpener, Latest
BROWN & SHARPE No. 13 Univ. Cutter & Tool Lal.
BRYANT #3, #6, 16-C-16, 16-CF-16, 24-36" Internal, Hydraulic, Latest Type
FITCHBURG 14"x25" Spline hydraulic, latest
HEALD 72A5, Hydraulic, Internal, latest type
HEALD 72A5 Internal, Gagematic, Latest type
La POINTE 60" Universal Broach Sharpener, Latest
VAN NORMAN #6-B, Osc. Radius Grinder, Latest
VAN NORMAN #666 Crankshaft ReGrinder, Latest

GRINDERS—SURFACE
BLANCHARD #11, 16" dia. mag. chuck, Latest
BLANCHARD 16A Vertical, Dial Feed, Motor Drive
HANCHETT #120 30x120" Plano, Hyd., Horiz. Latest
HEALD #22 Rotary, 12" chuck, latest type
HEALD 25A—rotary—24" chuck, Hyd., Latest

JIG BORERS
KEARNEY & TRECKER Model B Autometric, Latest
KNIGHT #4 Precision, Late Type
SOCIETE GENEVOISE (SIFF) #4 Precision, Table 19"x27", Motor Drive

LATHES—Engine and Mfg.
AMERICAN 36"x360 centers, 2 carriages, motor drive
JONES & LAMSON "FAY" 20"x50" Timken, Latest
JONES & LAMSON "FAY" 29x225", Automatic, latest
JONES & LAMSON "FAY" 24"x24" Automatic, Latest
LODGE & SHIPLEY 18x72 centers, M.D.
LoSWING 4x60, 4x84, 8x60, 8x108, 5x54, Latest
MONARCH 22"x156" Centers 3 Carriages, Timken Bearing, Model CM, Motor Drive
NILES 30"x50" Boring "Time Saver" Timken, Latest
NILES "Time Saver" 30"x11' Centers, Timken, Latest

LATHES—Hob and Cutter Relieving
CLEVELAND 12"x16" Centers, Cutter, Motor Drive
U. S. Tool #810B, 8"x15" Centers, Cutter, Latest

LATHES—Turret
BARDONS & OLIVER #5, #7, TIMKEN, Latest Type
GISHOLT #3L, #2L Universal, Timken, Latest
GISHOLT #3, Univ., Timken, Latest Type
LIBBY "International" 1HS Univ., Timken, Latest
MOREY No. 2G, No. 3, No. 4 Timken Bearing, latest
POTTER & JOHNSTON #5DE, Timken, Latest
WARNER & SWASEY 5, Universal, Timken, Latest
WARNER & SWASEY 3A Universal, M.D.

MILLING MACHINES—Mfg.
HALL Style L, Planetary, latest type
INGERSOLL 42"x8"x12" adj. rail, 4 heads, AC, M.D.
INGERSOLL 32x24x16" Planer Type 2 heads, AC, M.D.
INGERSOLL 36x24"x8', #3, rail slab, M.D.
SUNDSTRAND Model 3A Duplex 42" feed, Latest
TAYLOR & FENN MS9 Duplex Spline, latest

MILLING MACHINES—Plain
BROWN & SHARPE #2B, 3B Timken, Latest Type
CINCINNATI 0-8, 1-12, 2-18 Automatic, Latest Type
CINCINNATI #3, #4, #5 High Power, Late Type
CINCINNATI 4-36-36-36 Hydromatic, Simplex, Latest
KEARNEY & TRECKER #2H, 4H, 4K, Latest
KEARNEY & TRECKER 121S, 146L, Simplex, Latest

MILLING MACHINES—Thread
MOREY 12x36", 60", 120", 190" centers, Latest Type
PRATT & WHITNEY 6x60" Model C, Latest Type
PRATT & WHITNEY 4½"x12" Model C, L test Type

MILLING MACHINES—Universal
BROWN & SHARPE No. 2A Timken Bearing, Latest
BROWN & SHARPE No. 4A, Motor Drive
KEARNEY & TRECKER 2H, Timken, Latest Type

MILLING MACHINES—Vertical
GORTON 8D, Super-Speed, Latest Type
MOREY 12M Single & Double Spindle Profiler, Latest
REED PRENTICE 3VG, with or without hydraulic duplicator, Timken bearing, Latest Type

PLANERS
HETTS (CONSOLIDATED) 84"x92"x16" 4 heads, Box Table, Rapid Traverse, D.C., M.D., Late Type
HETTS (CONSOLIDATED) 108"x84"x36" 4 heads, Box Table, Rapid Traverse, D.C., M.D., Late Type
CLEVELAND 48"x48"x12' Openside, Motor Drive
NILES 30"x30"x10', 2 Heads, Box Table, Hyd., M.D.
NILES 96"x96"x24" 4 heads, Rapid Traverse, Box Table, D.C. reversing motor drive

PRESSES
HIRDSBORO 325 ton, vert. hyd., Latest Type
HLJ88 75-35 Hydro-Dynamic, Double Action, Latest
CLEARING K-1200-30 Knuckle Joint, 200 ton, 4" stroke, Latest Type
GLEASON 15", 25" Quenching, Motor Drive
LAKE ERIE 500 ton Vert. Hyd., Latest Type

MISCELLANEOUS
AJAX 3½" Forging and Upsetting, M.D.
BAKER #5 Keyseater Motor Drive
BARNES #172, 306H, 307, Vertical Hone, Hyd., Self Oiling, Latest Type
CAMPBELL, #40j Abrasive Saw, Latest Type
DE LAVAL #194 Coolant Clarifier, Latest
FOSTER 4"x18", 4"x36" Superfinisher, Latest
HELLER Model SS-1 Cold Saw, 6" cap., M.D.
LANDIS 2 Single Spdl. Bolt Threader, M.D.
NAZEL #4B Pneumatic Hammer, M.D.
PRATT & WHITNEY (KELLER) Type BL-2416, Type G, Copying 3 dimensional, Latest Type

MOREY MACHINERY CO., INC.
406 BROOME ST., NEW YORK 13, N. Y.
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CABLE ADDRESS: WOODWORK, N. Y.

HEADLINERS

LATHES

14"x78" ctrs Lodge & Shipley Selec. Grd. Hd., MD. taper
16"x51" ctrs American Grd. Hd., MD. taper
20"x94" ctrs American Grd. Hd., MD
24"x60" ctrs American Grd. Hd., MD
24"x72" ctrs Bridgeford, MD. Cullman Drive
24"x156" ctrs American Grd. Hd., MD. taper
36"x270" ctrs Lodge & Shipley, MD, 2 carriages, taper

MILLERS

No. 2 Cincinnati H.P. Rect. O/A Plain. MIB. Timken. PRT
No. 2B Brown & Sharpe Plain, arr. MD
No. 3 Cincinnati H.P. Plain, MD
No. 4 Ohio Plain, MD
No. 4 Cincinnati H.P. Univ., MD, Lima Drive
No. 4B Milwaukee Plain, MD, DOA
6"x36" Lees-Bradner LT Thread Miller, late
No. 1-12 Cincinnati Plain Automatic, late

SHAPERS

20" Gould & Eberhardt, cone
21" Smith & Mills, cone
24" Gould & Eberhardt, MD, gearbox
28" American, arr. MD, gearbox
28" Gould & Eberhardt, MD, gearbox
32" Gould & Eberhardt, MD, gearbox

GRINDERS

No. 2 Cincinnati Centerless
No. 3 Abrasive Surface
No. 16 Blanchard, MD, 26" chuck
10"x18" Norton Type C Plunge Cut, MD, new 1943

MISCELLANEOUS

400-ton Niles-Bement-Pond Hydraulic Wheel Press, MD
36" Bullard "New Era" VTL, MD
72"x60"x14' Cleveland Openside Planer, DC var. speed motor, AC MG-set
No. 1 Baker Keyseater, MD
No. 5 Baker Keyseater, belt
No. 2 Mitts & Merrill Keyseater, MD
No. 4 Mitts & Merrill Keyseater, MD
6" Cox Pipe Threader, MD
No. 6A Marvel Hack Saw, MD, new 1943

MANY OTHER MACHINES IN STOCK

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Three minutes from the Cincinnati hotel district.

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#50 EXCELLO HEAVY PRECISION THREAD Grinder (Largest made) will Thread 3" shaft any length through spindle, 68" centers 28" swing.

#124 Gardner Dis Grinder with Rotoclone
4 & 6 Spdl. Allen Drills Hand Feeds
500 Ton Erie Hyd. press 40x54", 28" st.
8"x108" LoSwing Lathe, AC motors
4—3" Gleason Strait Bevel Gear Generators
Model 61A, 71A, 7A Fellows gear shapers

#17 Gleason Hypoid Gear Grinder for fast precision finishing of hardened spiral bevel, serol bevel, & hypoid gears & pinions.

6x18 Norton plain cylindrical
34-36 Cinc. Hydromatic Duplex mill, late
Model 2L Gisholt 16" turret lathe
45-48 Cinc. tracer controlled hydromatic mill.
BL 2416 Keller Die Sinking Machine
30 HO Baker Drill inverted
10G Sellers single end drill grinder

36" Ohio Extra Heavy Duty rotary table hand & power feed.

10x36" Cinc. "EA" Hyd. Cyl. Grinder, late

T. R. WIGGLESWORTH MCHRY. CO.
1719 Superior Cleveland, Ohio

BEAVER-BILT*
Brown & Sharpe Automatic Screw Machines
Guaranteed to Operate the Same as New

THE FOLLOWING LATE TYPE, HIGH SPEED BROWN & SHARPE AUTOMATIC SCREW MACHINES ARE NOW IN STOCK FOR IMMEDIATE DELIVERY AT A FRACTION OF ORIGINAL COST.

1—No. 00	H.S. Serial No. 12401, Swing Stop, Vertical Cutoff Slide, ⅜" Cap., 5000 R.P.M. Spindle Speed, Countershaft. 1935. Beaver-Bilt.
1—No. 00	H.S. Serial No. 12775, Swing Stop, Vertical Cutoff Slide, Screw Slotting Attachment, ⅜" Spindle Cap., 5000 R.P.M. Spindle Speed, Turner Motor Drive. 1936. Beaver-Bilt.
2—No. 00	H.S. Serial Nos. 13064 and 13885, Swing Stop, ½" Spindle Cap., 6000 R.P.M. Spindle Speed, Countershaft. 1938. Beaver-Bilt.
1—No. 00G	H.S. Serial No. 16149, Swing Stop, ½" Spindle Cap., 6000 R.P.M. Spindle Speed, Motor in base. 1946. Beaver-Bilt.
1—No. 2G	H.S. Serial No. 10895, Swing Stop, Vertical Cutoff Slide, 1½" Spindle Cap., 2100 R.P.M. Spindle Speed, Motor in base. 1943. Beaver-Bilt.

Each of the above machines is Beaver-Bilt and complete with the following standard equipment—Standard Capacity Feed Tube—Front and Back Circular Tool Posts—Work Pan—Wrench Rack—Turret Hand Lever—Full set of Feed Change Gears—Full set of Spindle Speed Change Gears—Stock Stands—Complete set of Oil Splash Guards.

TRADE-IN SPECIALS IN GOOD OPERATING CONDITION

7—No. 00	Standard B. & S. Automatic Screw Machines Serial Nos. over 6000 complete with Countershafts and all standard equipment.
2—No. 00	High Speed B. & S. Automatic Screw Machines Serial Nos. 2526 and 8198 with Roller Bearing Spindles and motor drives with motors. These machines were recently rebuilt.
2—No. 00	High Speed B. & S. Automatic Screw Machines Serial Nos. 11410 and 11439 complete with Swing Stops, Screw Slotting Attachments, and Countershafts. These machines are in excellent operating condition.
1—No. 0	Standard B. & S. Automatic Turret Forming Screw Machine with standard equipment and countershaft.
4—No. 0	Standard B. & S. Automatic Screw Machines Serial Nos. 5263, 5525, 5526, and 6523 complete with standard equipment and countershaft. Good condition.
4—No. 0G	High Speed B. & S. Automatic Screw Machines Serial Nos. over 7000 with Roller Bearing Spindles, Motor-Driven Screw Slotting Attachments, and motor in base. In excellent condition.
2—No. 2G	Standard B. & S. Automatic Screw Machines Serial Nos. 2379 and 4310 with Single Pulley Drives. Good condition.
1—No. 2	Standard B. & S. Automatic Turret Forming Screw Machine Serial No. 2862 complete with Countershaft and standard equipment. Good condition.
5—No. 2	Standard B. & S. Automatic Screw Machine Serial Nos. 2702, 3174, 4437, 4484 and 5026 complete with standard equipment and countershafts. Very good condition.
2—No. 2	Standard B. & S. Automatic Screw Machines Serial Nos. 5040 and 5093 complete with Berkeley Motor Drives and standard equipment.

OTHER FINE MACHINE TOOLS

2—No. 0	B. & S. Hand Screw Machines Serial Nos. 1504 and 1522 with motors in base and standard equipment. 1940 machines. Excellent condition.
1—	New Jacobsen Cam Cutting Attachment mounted on a No. 3 size Oesterlein Milling Machine, Motor-driven, for cutting all size cams for Brown & Sharpe Automatic Screw Machines—excellent condition.
6—	Elgin Toolmaker's Lathes, 9/16" Cap., complete with benches, motors, and set of attachments. New in 1945. Excellent condition.
1—	Large assortment of miscellaneous Hardinge Bench Lathe and hand screw equipment with attachments. New 1945. In excellent condition.

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1. Beaver-Bilt Machines are *unconditionally guaranteed* to produce work to the same tolerances as a new machine of the same type.
2. Only genuine Brown & Sharpe replacement parts are used on Beaver-Bilt machines and no change is made from standard.
3. Beaver-Bilt Brown & Sharpe machines save you up to 50% of the cost of a new machine of the same type.
4. Each machine is properly skidded, crated, and loaded on a truck free of charge.

HERE'S THE BEAVER UNCONDITIONAL GUARANTEE

Any Beaver-Bilt or "as is" machine sold by us can be operated in your own shop for a period of 30 days and, if found unsatisfactory for *any reason whatsoever*, may be returned freight prepaid for a full refund of the purchase price.

We have specialized exclusively in the rebuilding and servicing of Brown & Sharpe Automatic Screw Machines for 15 years. You profit by this valuable experience.

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AUTOMATIC SCREW MACHINE, Acme-Gridley #6—⅞" Four Spdle, 5 h.p. 5 sets of collets. Tooling. Serial #15805. Excellent condition.
BORING MILL, Betts 78" Vert. Turning & Boring. New in 1943. All Electricals.
BORING MILL, 61" Bullard MAXI-MILL. 2 Hds.
BORING MILL, #0 Giddings & Lewis, 3½" Bar #5 M.T. 220/440 volts. TWO
BORING MILL, Bullard 54" Vert. Spiral Drive.
BOREMATIC, Heald #49 Sgle. End. W/Univ. Fixture, 220/440 volts.
BROACH, Oilgear 10 Tons Horiz. 56" Str.
BROACH, LaPointe #3B. 25,000# 56 Str. 2-speed
BUFFER & POLISHER, U. S. Electrical Multi-Speed Double End #95, 5 h.p., 220 volts. Four Speeds up to 2700 r.p.m. Floor model.
DRILL, Avey-Matic #3 Hvy. 2-Spdl. #3 M.T. 24". 15" C.C.
DRILL, Cincinnati 21" Bard. Drilling & Tapping.
DRILL, Radial, Cincinnati 5' Arm, 13" Col. #5 M.T. 24 speed gearing, 7½ h.p. 3/60/220.
DRILL, L. Gifford #2MS 14". 10" C.C. 3-Spdle
DRILL, Baker #314 Hvy. Pattern High Speed Vertical Boring & Drilling Machine, 7½ h.p. 220/440 motor, #3 taper, 12 feeds, 6 speeds, 12¼" throat, 3" Capacity in steel.
DRILL, Leland Gifford #2LMS Upright Sliding Head Two Spindle, #2 taper, 13" overhang. Independent 220 volts, 4-speed motors, indicated spindle speeds.
DRILL, Natco #12 Multiple Spindle Motor Driven, #1 taper, 3 h.p. 220/440 motor. Arranged for 18 spindles, Rectangular head, With Natco 24" Rotary Table.
RADIAL DRILL, Carlton 4'-15". Motor Dr.
STRAIGHT BEVEL GEAR GENERATOR 3" Gleason, Serial #18884, NEW — 1942, 220/440 volts motors. Gear Cabinet. Full Set of Index Gears, Segments, Auto-Index Attachment, Pneumatic Chuck Equipment, Cutter Setting Gauges & Segment Setting Gauges, Duplete Cutting Cam & Duplete Feed Cam.
BASE PITCH & SPACE MEASURING MACHINE, #337 Illinois, Late Type—Like New. Capacity—12" diameter gear, 15" between centers. Full Set of Off-Set and Straight Contact Fingers, Dial Indicator, Tailstocks and Leatherette Cover.
THREAD GRINDER, J & Lamson #TG-615 Automatic, Late Type
GRINDER, Blanchard #16, 20" Chuck Vert Rotary.
GRINDER, Landis Crank 10x32 Hydraulic.
GRINDER, Brown & Sharpe #2 Auto. Horiz. Surface.
GRINDER, Cincinnati #EA, 10" x 36" Hydraulic Cylindrical, Filmatic Bearings, 220 volts motors. Built-in electries, Hydraulic Infeed.
GRINDER, Norton 6 x 18 Hydraulic Vert. Rotary Auto. Exacto Spdle.
GRINDER, Norton 6 x 18 Hydraulic Horiz. Surface. Exacto Spdl.
GRINDER, Pratt Whitney 22" Vert. Rotary. 84" table travel.
GRINDER, Bath 10"x25" Motor Driven Universal Surface, 220/440 volts motor with centralized push button controls. Internal Grinder Attachment & Steady Rest, etc.
KEYSEATER, Mitts & Merrill #5 Giant Motor Driven, 220/440 volts motor, Capacity—24" long, 3" wide keyway, Automatic Feed.
LATHE, American 27" x 16' Crd. Hd. 12 speed. Taper Attach. & Chuck.
LATHE, LeBlond 36" x 30', 220/440 motor, 12 speed head, taper attachment, steady rests, etc.
LATHE, Bridgeford 26"x14' Q.C.G. 8"5" C.C. 220 volts two speed motor.
LATHE, Hardinge #5B High Speed Second Operation Machine, 1" Collet Cap. Automatic Collet Mechanism, collets, collet chucks, etc. FOUR.
LATHE, Monarch 18"x48" Model #CBB.
TURRET Lathe—Gisholt #4 Univ. Grd. Hd
TURRET LATHE, Bardons & Oliver #7 Universal Grd Hd. Ram Type. Hydraulic Speed Selector. 2½" Cap. 10 h.p. 220/440 motor, With Chuck, toolholders, etc.

PARTIAL LISTING OF LARGEST STOCK IN THIS AREA

MILLING MACHINE, Van Norman #3SP Horiz. 34x12x19. Late Type.
MILLING MACHINE, Cincinnati Vertical #3 H.S. Dial Type. W Rotary Table.
MILLING MACHINE, U. S. #MMI-6 Cam Controlled Automatic Horizontal, #40 taper, Late Type, 220/440 motors. TWO.
MILLING MACHINE, Van Norman #3V Ram Type Vertical, Late Type, 220/440 motors. Also stub arbors, arbor, vise, collets & cutters.
TURRET LATHE, W & S #4 Univ. Grd. Hd. 12 speed. Bar Feed W/tooling.
O.B.I. PRESS, Bliss #21B, 49 tons, 2½" Stroke.
O.B.I. PRESS, Bliss-Coe, #5½, 42 tons, 4" Stroke.
POWER PRESS, Bliss #164 Open Back S.S.S.A. 65 tons, 4" Stroke.
POWER PRESS, Bliss #58 Reducing, 17 tons, 6" Stroke.
POWER PRESS, Bliss #84 S.S.S.A. 56 tons, 10" Stroke, 20" between uprights.
POWER PRESS, Bliss #75½ S.S.S.A. 120 tons, 5½" Stroke, 24" between uprights.
POWER PRESS, Bliss #3A S.S. Dble. Crank S.A. Grd. 45 tons, 4" stroke, 36" between uprights.
WHEEL PRESS, Niles B & Pond 200 Tons Hydraulic Horizontal, 48" between strain bars. Two Plunger Type, 7.5 h.p. 220/440 motor.
POWER PRESS, Bliss-Consolidated #77 Open Back Gap Frame Sgle. Crank Sgle, Action Back geared. 175 tons, 10" stroke, Bed area—24" x 42", With Roll Feed and Roll Straightener.
POWER PRESS Ferracute #86 Double Crank Sgle. Action, S.S. Geared, 85 tons, 1¾" stroke, Bed area —61½" x 27¾".
POWER PRESS — Bliss - Consolidated #163 - B Straight Side Dble. Crank Single Action, 45 tons, 6" stroke, Bed area—24" x 41", 15 h.p. 220 motor.
SHAPER—Columbia 32" B.G. Crank.
SHAPER—American 24" B.G. Crank.
SHEAR, Gap Squaring, Niagara #9126B, 10'x¼" Overdriven, 18" Gap, 20 h.p. motor, 220 V. spring hold-down and extra blades.

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27"-30½"x84" Monarch Geared Head Engine Lathe. T.A.. M.D. (1942).

No. 14 Buffalo Steel Billet Shear, 5½" round capacity.

No. 10 Buffalo Steel Bar Cutter, 3½" round capacity.

No. 60 Cameron Rotary Cap Thread Roller, M.D.

No. 40-5 Minster S.S.—D.B.G. Press, 16" stroke.

No. 3¾ Bliss S.S. Toggle Press.

No. 6 Bliss S.S. Tie Rod Press.

No. 174 Toledo Tie Rod Toggle Press.

No. 660 Toledo 100 ton Knuckle Joint S.S. Press.

50 Ton Henry & Wright Dieing Machine.

No. 4 LaPointe Broach, 50 ton capacity.

20" Ohio Shaper (1943).

Model T-4-24 American Hydraulic Vertical Broach (1944).

10"x18" Cincinnati Model EA Grinder, serial #5P2A1L-13.

1-1/16" Model B Cleveland Automatic (1946).

1½" Conomatic Automatic Screw Machines, late (2).

No. 354 Niagara Power Slip Roll Forming Machine (1942)

No. 1 Savage Nibbler (1942)

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GUARANTEED TOOLS

16"x60" PRATT & WHITNEY Toolroom Lathe

18"x96" CINCINNATI Lathe, Taper, 1942

20",40"x14' RAHN LARMON Geared Head Sliding Bed Gap Lathe

24"x24' LODGE & SHIPLEY Lathe, 18' centers

No 4A WARNER & SWASEY Turret Lathe, Full length leadscrew, tooling, New 1942

Model R-14 SENECA FALLS "Lo-Swing" Lathe, 16"x40", automatic timing, 1941

No. 12 BROWN & SHARPE Automatic Milling Machine, 1942

No. 2MH CINCINNATI Plain Horizontal Mill, 1942

No. 2M CINCINNATI Universal Mill, rectangular overarm, motor in base, dividing head

No. 2 CINCINNATI Dial Type Vertical Mill, 1941

No. 3 CINCINNATI Dial Type Plain Mill, Vertical Head, 1941

No. 4 REED PRENTICE Vertical Mill and Die Sinker, rotary table, 1942

No. 1-18 CINCINNATI Plain Mill, 1942

4" TAYLOR & FENN Duplex Spline Mill, 1942

4'13" CARLTON Ball Bearing Radial Drill

6' FOOTE-BURT HAMMOND Jackknife Radial Drill with electric tapping attach., 1942

No. 31 LUCAS "Precision" Table Type Horizontal Boring Mill, 3" bar

42" BULLARD New Era Type Vertical Turret Lathe, side head, AC motor

84" CONSOLIDATED COLBURN Vertical Boring Mill, 2 swivel heads, rapid traverse, AC—MO

No. 5 GALLMEYER & LIVINGSTON 12"x36" Surface Grinder

No. 3 BROWN & SHARPE Universal Grinder, internal attach., 1941, cap. 14"x40"

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HOBBING MACHINE

#130 CLEVELAND RIGIDHOBBER 8" max. gear dia., 8" travel. Late Model—Excellent Cond.

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Capacity—Steel Turnings 2½ to 3½ tons per hr. Feed Opening 31"x37". Machine No. 2400. Type ST.T., Serial No. 1824 $1,500.00
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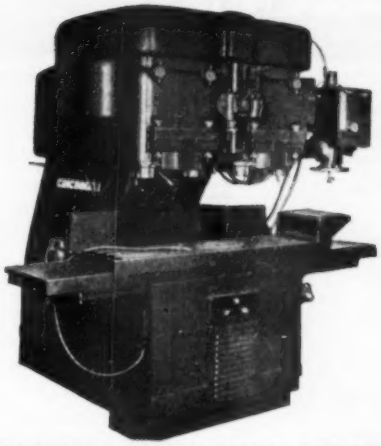

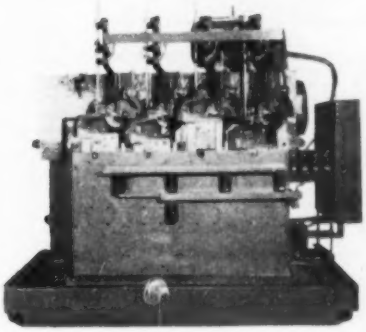

CINCINNATI 4-SPINDLE 360° AUTOMATIC PROFILING MACHINE

Table working surface 14"x47¾"
Longitudinal travel of table 12"
Transverse travel of cross-slide 15"
Vertical travel of head 6"
Spindle center distance, center to center 12"
No. 40 National Standard Taper
Diameter of spindle nose 3½"
Diameter of hole through spindle ¾"
Speeds 20, 125 to 3800 RPM
Feeds—Infinite range 1" to 50" per min.
Complete with motors, pumps, piping and all electrical controls. Weight approx. 10,300 lbs.

JUST RECEIVED!!!

12"x102 Lees Bradner, model HT, 6" hole through spindle. 3-jaw universal chuck at each end of spindle. Latest
14"x72" Cincinnati Uni Grinder, latest
#24 Gleason St. Bevel Gear Generator

Davis & Thompson 4 Spindle Rise & Fall Milling Machine built for high production milling of small pieces. Clamping is accomplished by hand. One operator is required for the machine. The table action is such that the operator can go from one table to the next removing pieces and putting in rough castings while the other three tables are working. This machine can also be arranged with power clamping. Productions vary according to the character of the work.

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Heald No. 49 Borematic, 2 Spindle Hydraulic Cross Table
Fisher, 5" Bar Floor Type Horizontal Boring Mill, AC-DC Drive
Gorton 3L—Three Dimensional Pantograph with Cutter Grinder
Bliss O.B.I. 6 Double Crank Presses
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National Machinery Exchange
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#35 Landis Horizontal Boring Mill, 3½"
6'17" Carlton Radial Drill
#174 Heald Internal Grinder
4-36 Cincinnati Hydromatic Miller
28/120 Cincinnati Horizontal Hydrotel
24" Bullard Vertical Turret Lathe
8"x48" Jones & Lamson Thread Grinder

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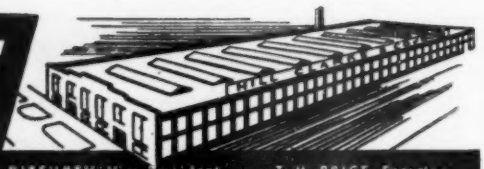

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1, 2, 3, 4, 5, 6 Spdls Leland-Gifford, Allen, Edlund, Aveys
No. 4BL Natco 36 Spdl. (1943)
No. 150 Baker
No. 112 Defiance
4'-15" Col. American Hole Wizard

GEAR MACHINES
No. 61-A Fellows Gear Shaper (1942)
No. 71-A Fellows Gear Shaper (1942)
No. 7125 Fellows (1943)
No. 72 Fellows Gear Shaper
No. 5A Lees-Bradner Gear Generator
No. 12 Gleason Bevel Gear Generator
No. 5—60" Brown & Sharpe Gear Cutter
No. 13 Brown & Sharpe
No. 3 Barber-Colman Hob Sharpener

BORING MACHINES
No. 31 Lucas 3" bar, M.D.
Rockford—3¼" Bar
No. 32 Giddings & Lewis 3½" Bar
No. 2 Lambert 4" bar
No. 46-B Heald Bore-Matic (1942)
No. 112—C Excello 2 Spdl. (1942)
24" Bullard New Era
36" Bullard New Era
42" Bullard New Era
42" King
60" Colburn, M.D.
72" Niles-Bement-Pond
84" Betts, M.D.

GRINDERS
3"x12" Brown & Sharpe No. 5 (1944)
4"x12" & 4"x18" Landis, Model H (1942)
6"x18" & 6"x30" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
10"x18" Norton Type C Plain (1943)
10"x48" Norton Type C Plain (1943)
10"x72" Landis Type O Hydraulic
Norton Motorized Grinders ranging from 6"x18" to 24"x144"
No. 5 Bryant Internal Grinder
No. 3 Abrasive Surface Gdr.
No. 34 Abrasive Surface Grinder (1943)
16" Arter Rotary Surface Grinder
No. 25-A Heald Surface Grinder
No. 72-A-3 Heald Internal (1942)
No. 72-A-5 Heald Internal (1942)
No. 16—38 Bryant Internal Gdr.
No. 81 Heald Pl. Centerless

LATHES
18"x6' American, Gdr. Head, M.D.
18"x8' American Gd. Had.
24"-27"x32' Lodge & Shipley
36"x16" Betts—Bridgeford Grd. Head
10"x22" Sundstrand, Model AA (1943)
20" Fay Automatics (1942)
Model R-14 Seneca Falls Lo-Swing
No. 4 Warner & Swasey, Bar Feed
No. 4 Gisholt Univ. Turret Lathe (1942)
No. 6 Warner & Swasey, Bar Feed
No. 4R Libby (1942)
No. 1A Warner & Swasey, Bar Fd.
No. 4F Fastermatic (1942)

MILLING MACHINES
No. 3B Milwaukee Plain
No. 4 & No. 5 Cincinnati H.P. Plain
No. 3 Cincinnati Universal
No. 00 Cincinnati Vert.
No. 2½-B Milwaukee Vert.
No. 2 Cincinnati Dial Type Vertical (1941)
No. 3 Cincinnati H.P. Vertical
No. 1-18 Cincinnati H.P. Vertical
No. 1-18 Cincinnati Mfg. (1942)
No. 2—18" Sundstrand-Electromil (1942)
No. 3-24 Cincinnati Hydromatic (1942)
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 45-48 Cin. Hyd. Tracer (1941)
No. 54-72 Cincinnati Hydromatic
6"x36" Lees-Bradner—Model LT (1943)
10"x48" Hanson-Whitney Thread (1942)
48"x24"x12' Ingersoll Slab Miller
36"x24"x12' Ingersoll Duplex Miller (1946)
No. 10 Ingersoll 72"x6' Travelling Col. Face Millers (1942)
No. 36—120 Cincinnati Horizontal Hydrotel

MISCELLANEOUS
20" American Hvy. Shaper
36" Ohio Shaper
18" Dill Slotter
Micromatic Vertical & Horizontal Hydrohoners

PLANERS
36"x36"x12' Cincinnati
36"x36"x18' Gray Maxi Service, 4 Heads
48"x36"x14' Gray
48"x48"x12' Cincinnati, 4 Heads
144"x78"x48' Liberty Openside Planer

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LATHE—Engine, Mackintosh-Hemphill, 72"/110"x30' Centers (1943)
VERT. MILL—Cinc. Hydrotel #28/60, 4- spindles, Tracer (1942)
CRANE—150 Ton x 30' span, Whiting, Bridge, 3 hook trolley.

BORING MILLS—D & H 3½" horiz., floor.
Vertical Turret Lathe, 30".
Bullard, 72", 2 swivel heads on rail (old).
DRILL PRESS—Minster #2D, 2½" cap. Hvy.
Snyder, 1½", 28" swing.
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GRINDER—Surface, Reid, Model 2-1 (late)
LATHES, Engine — Sebastian 16"x36" Centers (late).
Logan 11" Cabinet (late).
Turret—Foster #1B Universal, Chucker, 2⅜".
Logan 1" Hand Screw (late).
Midland #5 Chucker 3"—1943.
MILLERS—Newton Vert. 42' Rotary Hvy.
Cinc. #3 Vert. Hi Power.
Br. & Sh. #3 Universal.
Cinc. #08 Vert. (late).
PUNCH—Sq. end, Smith 1-1/16" thru ⅝"
ROLLS, BENDING—H. & J. 30'x¾", Pyr.
Southwark 15'x3" Vert.
Niles, 11'x¾", Initial.
ROLLS, ANGLE—Bertsch 3"x3"x⅜".
SHEARS—Alligator (#2) 24" blade, 3" Rds.
Rotary, Quickwork #50A, 48"x¾" (late).
Pexto Square, 6'x16 g. Gap (late).
THREAD MILLS—Morey 12"x10' Centers (late).
Lees-Bradner 9"x36" Centers.
THREADER, BOLT—Acme 2½" cap.
PRESSES—Z & H #7, 50 ton Percussion.
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Bliss #78½, 450 ton, 18" Stroke.

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All Late Type

54" Bullard Vert. Turret Lathes (2), latest type
5" Giddings & Lewis Boring Mill, #45T with Detroit Universal Duplicator
4" and 6" Sellers Horizontal Boring Mill
3" Universal Horizontal Boring Mills (2)

40"x15' LeBlond Engine Lathe, latest type
Bullard Multaumatics, 16", 12", 8", late
Sgl. Spdl. Cleerman (1949)
Sibley (1941) Drill Presses, #5 M.T.
#28/60 Cincinnati Hydrotel 4 Spdl., '44
9/16", 2¼", 2⅝" RA6 Acme Gridley Auto.
20" Gould & Eberhardt Shaper
Hardinge Multipurpose Chucking Machine, 1950
60" Bickford Vertical Boring Mill
75 Ton Henry & Wright Dising Press
Kane & Roach 5 Station Roll Former

CHUCKERS
6" 6 Spdl. Acme Gridley and 6" 8 Spdl.
#865 New Britain Chuckers. (3)

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WICKES CRANKSHAFT LATHE
UNIVERSAL MODEL UH-4
36"x17'6" BED, DOUBLE END, NEW 1941
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#3 NEWARK GEAR HOBBER
UNIVERSAL TYPE, HORIZONTAL, SERIAL #788, DIAMETER CAPACITY, W/BUPPORT ARM 18".—PRICE $3,250.00
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Union Mfg. Co., 21" diam., 3 revers. jaw Universal Chuck, 5¼" hole, in original grease and box. Never used. Price—$290.00
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CINCINNATI: 2-spindle Vertical Hydrotel with two rotary tables.
CINCINNATI: #2M Vertical, Rotary table, P.F.
CINCINNATI: 8-8 Vertical
SUNDSTRAND: 96 Rigidmil—Duplex (for milling cam tracks in propeller hubs or similar work)
SUNDSTRAND: #00 Rigidmil—Hydraulic
SUNDSTRAND: #0 Rigidmil
MOREY: 12M 2-spindle Profiler
TAYLOR-FENN: M-80 Duplex Spline
TAYLOR-FENN: Vertical 6"x21" Table, power feed
RICE-BARTON: Duplex Spline
VAN NORMAN: 10CT Contour Miller

THREAD MILLERS & TAPPERS
HANSON-WHITNEY 8"x16" Thread Miller
MOREY: 12"x60" Thread Miller
LEES BRADNER: 40A Thread Miller
LEES BRADNER: LT 6x36" Thread Miller
HALL PLANETARY: B, C & D Thread Millers
MURCHEY: #22 Tapper, Horizontal
PRODUCTO: Hand Tapper
NATCO: Vertical Tapper 16 spindle

TOOL SHARPENERS
OLIVER: 2A Face Mill Grinder
OLIVER: 510 Drill Sharpener
OLIVER: 10" Tool Bit Grinder Template Type
FELLOWS: Flat Top Helical Gear Cutter
RANSOM: 2-wheel grinder 5 HP

GRINDERS—THREAD
EXCELLO: #3I & #33 External
JONES & LAMSON: TG-63S External
JONES & LAMSON: TG84S External
JONES & LAMSON: TG1245 External

GRINDERS—CYLINDRICAL
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NORTON: 10"x18" 45° angle wheel head
NORTON: 12"x36" Universal
LANDIS: 18"x18" "C" Plain Hydraulic
LANDIS: 18"x32" Type "D" Crankpin, Hydraulic
CINCINNATI: #2 Centerless
CINCINNATI: 6"x18" Hydraulic Filmatic
BROWN & SHARPE: #10 & #23 Plain

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BRYANT: #5 and #5Y Internal
BRYANT: 18C16 Internal
HEALD: #95 Planetary
HEALD: 70A Plain Internal
HEALD: 72A1, 72A5 Plain & Universal
HEALD: 72A3 Sizematic Centerless
HEALD 72A5 Sizematic
HEALD 172 Sizematic for Cylindrical Cams
BRYANT: 112 Universal, Hydraulic
BRYANT: 16-28 Hole Grinder
BRYANT: 24-36 Heavy Duty Internal
RIVETT: #104 Tool Room Universal

GRINDERS—RADIUS
VAN NORMAN: #73, 630, 640 Oscillating
VAN NORMAN: #3½ Universal

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THOMPSON: 8"x12"x18" Type B
THOMPSON: 12"x18"x96" Type C
HEALD: Rotary 8" dia. chuck
HEALD: #22 Rotary—12" Chuck
GARDNER: 12B4 Opposed Head Disc

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NORTON: #26C and 26F Hyprolaps
NORTON: #2Fx48" Diameter Lapper
SCHRANER: External Cylindrical Lapper with six Heads

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PRATT & WHITNEY: 10" single & double wheel
GEAR GRIND MACH: GG-19 (10"x24"). Hydrolic Spur Gears & Splines also internal
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MAAG: 8B30 (1¾" diameter

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BROWN & SHARPE: #6 Cutter—72" diameter
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GOULD & EBERHARDT: 36DM Cutter
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GLEASON: #4 & #5 Bevel Gear Testers, Hand & Power Operated
GLEASON: 5" Bevel Gear Tester
ILLINOIS: #72A Involute Checker and Recorder
RED RING: 81C-12" Gear Tester
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BARNES: #412 Horizontal 60" Travel
HEALD: 48A Single End 2-spindle
HEALD: 47A Single End 2-spindle
HEALD: 46B Double End Borematic

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POTTER & JOHNSTON: #4D Automatic
SUNDSTRAND: 8x15 & 12x22 Auto. Lathes
LODGE & SHIPLEY: #3A Duomatic
LIPE-ROLLWAY: 15"x30" Carbomatic
LEBLOND: 25"x48" Engine Lathe, raised to 40"

LATHES—TURRET
GULLARD: 24", 30" Vert. Spiral Drive
WEBSTER & BENNETT: Vertical Turret Lathes 36", 48" and 60" sizes
GISHOLT: No. 4 and 5, Ram Type
HERBERT: Turret Lathes (all sizes)

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LELAND-GIFFORD #2LMB Deep Hole Vertical
BARNES: 20H¼ 2 spindle on 4 spindle base
BAKER: 30HD 2 spindle inverted 4" dia. cap.
BAKER: 21F Upright Heavy Duty 2" dia. cap.
FOSDICK: #48M Upright High Speed
PROVIDENCE ENG: 6-spindle ⅝" capacity
PRATT & WHITNEY: ½-8x50 Deep Hole Reamer
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ACME-GRIDLEY: RA6 9/16" 6-spindle

MISCELLANEOUS
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BLOUNT: Polishing Lathes 12x48
GARDNER: #6 Disc Grinder
ALLEN #2 Stud Setter
CAMPBELL: #425 Abrasive Cutslator
WILLIAMS: 10" Pipe Cut-Off
TANNEWITZ: GH-36 Band Saw High Speed
RANSOME: #36 Welding Positioner Motor Drive
KENT: 3½" Bar Pointer and Chamfer
MATTHEWS 79A Marking Machine
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Cinc. #00 Rise & Fall, #1-12 and 2-24 Production
K&T "Milw" 1H-18, #9H8 Production
Hanson-Whitney 8"x16" Thread, with relieving
Van Norman #22 Swivel Head
B&S #2 L.T. Swivel Head, Vertical
Cinc. #3 H.S. Vertical
K&T "Milw" #2K Vertical

MISCELLANEOUS
48x48x12, 42x34x10, 36x36x12, 36x36x10 Planers, older style
P&W #12B 2-spdle Profiler
100-ton C-frame Perkins 1½" str.
Foote-Burte 1⅝" Auto. Screw Machine
Heald #40 Borematic
Sundstrand #53 Centering Machine
Foster Hdr. Cyl. Superfinisher
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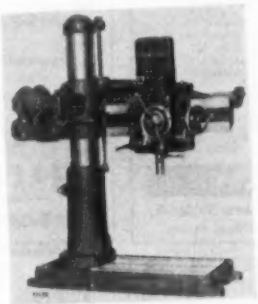

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No. 2B Brown & Sharpe, m.d., latest
No. 2 Cincinnati H.S. Dial, m.d., latest
No. 2 Cincinnati Plain H.P., belted m.d.
No. 2 Rockford, m.d.
No. 2G LeBlond, belted m.d.
No. 2H Milwaukee, m.d.
No. 2M Cincinnati, m.d. in base
No. 3 Cincinnati H.P., m.d., p.r.t., late type
No. 3B Brown & Sharpe, m.d., late
No. 3, 4 Kempsmith Maxi-Miller, m.d.
No. 3G Milwaukee, m.d.
No. 3 Van Norman Duplex, s.p.d.
No. 4 Cincinnati H.P., m.d.
No. 4 Ohio, cone
No. 4K Milwaukee, m.d., late type
No. 5 Cincinnati, rect. overarm, m.d.
No. 5 H.D. LeBlond, s.p.d.
No. 5B Brown & Sharpe Heavy, m.d.

UNIVERSAL MILLING MACHINES

No. 2A Brown & Sharpe, s.p.d.
No. 2 Cincinnati, cone, motorized
No. 3 Kempsmith, cone
No. 3A Brown & Sharpe, s.p.d.
No. 4A Brown & Sharpe, m.d.
No. 4 Cincinnati H.P., m.d.
No. 4G LeBlond, s.p.d.

VERTICAL MILLING MACHINES

No. 0B Cincinnati, m.d., latest
No. 2M Cincinnati, m.d.
No. 3, 4 Cincinnati H.P., m.d.
No. 2, 3 Cincinnati High Speed Dial, m.d., latest
No. 2, 3 Cincinnati Medium Speed Dial, m.d., latest
No. 2H, 4H Milwaukee, m.d., latest
No. 2HL Milwaukee Swiveling Head, m.d., latest
No. 2K, 3K Milwaukee Dial, m.d., latest
No. 2½B, 3B Milwaukee, m.d.
No. 3V Toledo, s.p.d.
No. 3V Van Norman, m.d., latest
No. 3 VG Reed-Prentice, m.d.
No. 6 Becker, cone
Cincinnati Hydromatic, m.d., 2 spindles

PLANERS

P10 Coulter Crank Type Shaper-Planer, 1 head, m.d.
20"x20"x5' Whitcomb-Blaisdell Planer, belted m.d., 1 head
24"x24"x6' Cincinnati, m.d., 2 heads
30"x30"x10' Cincinnati, belted m.d., 2 heads
30"x30"x10' Gray, 2 heads, belt
32"x32"x16' Gray, 2 heads, belt
36"x36"x8' Gray, belt
36"x36"x10' Cincinnati, belted m.d., 2 heads
30"x30"x10" Niles, 2 heads, belt
36"x36"x12' Cincinnati, belt
36"x36"x16' Cincinnati Hypro D.H., v.v.d., 2 heads on rail & 2 side heads, latest
36"x36"x16' G. A. Gray, reversing m.d.
36"x36"x18' Niles-Bement-Pond, 2 heads, reversing m.d.
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x29' Gray, 2 heads, belt
36"x36"x24' Cincinnati, belted m.d., 2 heads
38"x38"x29' Gray Spiral Drive, 2 heads, belt
42"x42"x28' Gray, 2 heads, belted m.d.
48"x48"x18' Detrick & Harvey, 4 heads, reversing m.d.
46"x46"x28' Cincinnati, 4 heads, reversing m.d.
48"x48"x30' Cincinnati, 4 heads, m.d.
48"x48"x32' Niles-Bement-Pond, 4 heads, reversing m.d.
62"x62"x40' Cincinnati, 4 heads, reversing m.d.
60"x60"x40' Niles-Bement-Pond, 4 heads, reversing m.d.
72"x72"x36' Niles, 4 heads, reversing m.d.
96"x72"x18' Pond, 4 heads, belted m.d.

PRESSES

48x36" Chambersburg Cocostamp Air Operated
C5 Ferracute O.B.I. Power Press, flywheel type, m.d.
Ferracute Double Crank, 36" between uprights, 84 ton cap.
90"—400 ton Niles Driving Wheel Press, m.d.
Chambersburg 30 ton Hypro Pneumatic
Metalwood B35, B45
No. 7 and 8 Thomas Punches, latest
No. 2 Hilles & Jones Horizontal Punch, m.d.

SAWS

7½ H.P. Cincinnati Elec. Tool Co. Abrasive Cut-off Machine, type JCAW
No. 3 and 8 Nutter & Barnes Cold Saws
No. 6 Cochran Bly Cold Saw
No. 13B Espen Lucas Cold Saw, m.d.
Gustav Wagner Cold Saw, m.d.

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio — MElrose 1241 — CABLE ADDRESS EMCO

BL-2416 Keller, 3 dim., 3 spin., Late
No. 9J Gorton Elec. Duplicator, 1944
18-36 K. & T. Simplex Miller, 1942
30-90 Cinci. Duplex Hydro. Miller, '42
No. 3 Cinci. Dial Vert. Miller, Late
No. 2LU Van Norman Univ. Miller, '42
42" King Side Hd. Vert. Bor. Mill, '43
2½" bar #25T G. & L Table Hor. Bor. Mill
3" bar Yoder Table Hor. Bor. Mill, '42
5" bar Sellers Floor Hor. Bor. Mill, '42
6'17" col. Carlton Radial, new 1943
5'14" col. Amer. Tri. Purp. Radial, AC, M.D.
4'11" col. Canedy Otto Radial, '42
Barnes Combo. Boring & Honing Mach. up to 10" bore x 6" hole, 1942.
30"x120" Hanchett Plano Surface Grinder
12"x30" cen. Pratt Whitney Model B La., '43
14"/10¾"x30" cen. L. & S. Lathe, T.A., '43
14/10½"x54" cen. Bradford La, T.A., '43
30"x20' cen. Axelson La., T.A., 34" swing
48"x20'6" cen. Simmons Lathe, 1942
48"x26' cen. Amer. La., 2 carr., 2 T.A.
16" Gomco Univ. Shaper, '43, near new.
20" Smith Mills Univ. Shaper, New
No. 2G Morey Univ. Turret La., New
10'x10 ga. Cinci. Press Brake, 50 Series

BENNETT MACHINERY CO.
30 Church St., New York 7, N. Y.
Plant—Route 5-3, Clifton, New Jersey

LATHE

48"x26' centers American "Super Productive," 2 carriages, 2 tapers, late.

PLANER

36"x36"x14' Cincinnati "Hypro," Power Rapid Traverse, Direct Motor Drive.

BORING MILL

245 Giddings & Lewis 4½" bar, table type, Power Rapid Traverse, M.D.

Hundreds of Other Tools in Stock.

THE O'BRIEN MACHINERY CO.
1545 N. Delaware Ave., Phila. 25 P.A. GA. 6-1150

PRICED RIGHT

Two New—Stewart Gas Fired Furnaces; one at 1400 to 2000 degrees F; one at 350 to 1200 degrees F; Hearth dimensions 9' high, 15" wide, 24" long; with Wheelco Controls.

BARRON MACHINERY COMPANY
113 South Clinton St., Chicago 6, Illinois

Landis 6x18 O.D. Grdr. New Cond. Cheap
Keller BG-1 Excel. Cond. Low Price
Planer 3'x3'x10' Bed 20' Excel. Cond.
Slitter 54" Tin Plate with Feed Tables
Brakes, Shears, Rolls, Sht. Mtl. Equipt.

J & L MACHINERY & SUPPLY CO.
7906 Mack, Detroit, Mich. WA 5-0800

BENDING ROLL

Model No. 60, Kane & Roach, Wrapping Type, with 40 HP Motor. Machine Serial No. 201784. $2,750.00

EXCELLENT CONDITION

WINSTON MACHINERY COMPANY, INC.
517 South Delaware Street, Indianapolis 4, Ind.

MACHINERY FOR SALE

Bertsch Straightening Roll, ⅝" capacity, 6' between housings. Condition like new. Price $9,750.00

FAIRFIELD EQUIPMENT CO.
100 Sanford St. at R.R. Station FAIRFIELD, CONN.

SHAPERS

36" Cincinnati Heavy Duty, 10 HP, Motor 3/60/220-440 volts, Universal table, P.R.T., automatic power down feed to head, single screw vise. Ser. 20462. 3 Weeks Service. Equal to New.

20" Cincinnati Heavy Duty, Motor 3/60/220-440 Volts. Ser. 14020. Fine condition.

QUICK SHIPMENTS

GALBREATH MACHINERY CO.
306 Empire Bldg. Pittsburgh 22, Pa.

FOR SALE

PIPE MACHINES MOTOR DRIVEN
Outer #304—1" to 4"
Outer #8—2½" to 8"
Eaton, Cole and Burnham—6" to 12"

1—#2 Savage Roller type Nibbling Machine, complete with circular attach. V-belt drive to 3 HP motor. Good condition.

PHILA. TRANSFORMER CO., 2829 Cedar St. Phila. 34, Pa. GArfield 6-1900

FOR SALE

Industrial Deepfreeze "Cascade"—3 stage compressor with 2—½ HP and 1—⅓ HP motors all single phase, 110 volts. Removes 1,000 BTU's per hour at—120°. 24" x 36" deep chamber. Santocel insulation. For shrinking, testing and treating of metals. Excellent condition. Complete $900.00.

THE VAN KEUREN CO.
176 Waltham St., Watertown, Boston, Mass.

LATE TYPE MACHINE TOOLS

MAJORITY NEW SINCE 1940-1945

Fully Guaranteed

GRINDERS

2 Norton Tool & Cutter
6"x18" Cincinnati Plain Hydraulic
6"x18" Cincinnati Plain Hydraulic
10"x18" Norton Model C Plain Hydraulic —1942
8" No. 2 Heald Rotary Surface
No. 25A Heald Hyd. Rotary Surf 27" chuck
No. 300 Hanchett Hyd. Vertical Surface
14" Pratt & Whitney Hydraulic Surface

PRODUCTION MILLING MACHINES

21 Sundstrand Rigidmil
23 Sundstrand Rigidmil
234-36 Cincinnati Hydromatic Plain—tracer cont. 1941
256-96 Cincinnati Hydromatic Plain—1940

NUT AND BOLT EQUIPMENT

2250C Manville SSSD Header
¼" National Precision Nut Tapper
2 Waterbury Farrel Nut Tapper

LATHES

210 Sundstrand Automatic Lathe
14"x30" Hendey Geared Head. 1942
16"x30" Reed Prentice Geared Head
20"x48" Lodge & Shipley Geared Head. 1942
42"x108" Niles Heavy Duty Geared Head. 1943
23 Hendey Hi-Speed Turning Lathe

VERTICAL MILLING MACHINES

22 Cincinnati Dial Type Medium Speed—42
23V Van Norman—1943

PLANERS

48"x48"x16' Cincinnati Hypro Double Housing. 1941
48"x48"x26' Niles-Bement-Pond
120"x96"x20' Cincinnati

TURRET LATHES

24 Warner & Swasey Universal Geared Head—1945
23A Warner & Swasey Universal Geared Head

MISCELLANEOUS

23 LeBlond Rifling Machine—1941
W. F. & John Barnes Heriz. Honing Machine—1942
No. 420 W. F. & John Barnes 2 spdl. deep Hole Driller & Borer. 1942
No. 12 Bertsch Seven Roll Plate Straightening Roll—1942

DRILLS

24" Cincinnati Bickford Box Column Single Spindle
26" Barnes All Geared Single Spindle
5' Dreses Radial

SAWS

10" x 10" Racine
2V-36 Do-all

SHAPER

25" Smith & Mills

J. L. LUCAS & SON, INC.

P.O. BOX 3006A — BRIDGEPORT, CONNECTICUT

UNUSUAL VALUES

Milling Machines—No. 1 Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 42".

Grinders—Cylindrical B & S No. 11, Planer type 16"x36" Surface 12"x32", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x8', 8', 10'—10"x8', 8', 10'—18"x8', 8', 10'—36"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized.
Large stock 19" and 16" bench and floor type.

Planers—Single head 24"x8', 24"x8', 26"x8'.

Shapers—16", 20", 24" B.G. crank.

Turret Lathes—J & L 2"x24"—3"x36" also Asmo, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 42".

SPECIAL—New totally enclosed dust proof, fan cooled ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt No. 25 24" Hi Duty 8" capacity in steel. Motor attached.

PATTERN MAKING MACHINERY—42"x18' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.

P. O. Box 88 — Columbus 16, Ohio

LATE MODEL MACHINE TOOLS . .

AUTOMATICS

No. 40 New Britain Chucker. 1941.
No. 12"x21" Fay Automatic. 1942.

BOLT MACHINES

No. 500C Manville Thread Roller. Latest.
No. 250C Manville Header, 888D. Latest.

BORING MACHINES

62" King Vertical. 1942.
40 & 49 Heald Single End. 1943.

DRILLS

6'15" American Hole Wizard. 1941.
No. 26HO Baker. 1942.

GEAR EQUIPMENT

No. 6 Gleason Revacycle. 1941.
No. 6 & 17 Gleason Testers. 1943.
8" Red Ring Internal Shaver. Late.
No. GCL Red Ring Shaver. 1942.
No. 645A3, 615A & 61A Fellows. 1944.
No. 72 Fellows Shaper. 1943.
Red Ring Univ. Checker.

GRINDERS, CYLINDRICAL

25"x48" Landis Crankshaft. Like New.
16"x36" Cincinnati Plain. 1942.
12"x30" Landis Univ. 1941.
10"x72" Landis Plain. 1942.
10"x18" Norton Plain. 1942.

GRINDERS, SURFACE

No. 18 Blanchard Rotary. 1942.
30"x24"x192" Mattison. 1943.
14"x36" Pratt Whitney. 1943.

GRINDERS, INTERNAL

No. 24-36 Bryant Hyd. 1943.
No. 172 Heald Gap. 1940.
No. 72A3 & A5 Heald Rotary. 1942.
No. 73 Heald Hydraulic. 1942.

LATHES, ENGINE

27"x96" LeBlond. 1942.
16"x54" Reed-Prentice. 1942.
14"x30" Bradford. 1942.

LATHES, PRODUCTION

No. 3A L&S "Dumatic". 1943.
8"x108" Lo-Swing Semi. Auto. 1942.
14"x42" Monarch "Magna-Matic". 1941.

LATHES, TURRET

No. 4A Warner & Swasey. M.D.
8¼"x24" Acme Univ. 1943.
No. 5.0 Acme Univ. 1942.
No. 3R Gisholt. 1943.
No. 3H Libby. Late.
No. 6R Denver. 1942.

MILLS, PLAIN

No. 5K Milwaukee. 1943.
No. 3B Brown & Sharpe. 1941.

MILLS, PRODUCTION

No. 1-14 & 2-26 Kent Owens. 1942.
No. 24-36 Cincinnati. 1942.
No. 1-18 & 2-24 Cincinnati. 1942.

MILLS, THREAD

6"x36" Lees Bradner. 1942.

MILLS, UNIVERSAL

No. 2MH Cincinnati. 1942.

MILLS, VERTICAL

No. 4H Milwaukee. 1942.
No 3H Milwaukee. 1942.
No. 2 Cincinnati. 1942.
No. 1 Cleveland. 1942.

PRESSES

50 Ton Denison, Hyd., Str. 1942.

SHAPERS

20" Cincinnati Plain. Late.
6" Pratt & Whitney. 1942.

WELDERS

150 KVA Federal Seam. 1943.
60 KVA Federal Spot. New.

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INDIANAPOLIS *Machinery & Supply Co.*
1961 S. Meridian St. • • Indianapolis, Indiana

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It's your assurance of quality machine tools backed up by three generations of machine tool experience. Every Goldman machine tool is fully guaranteed to give complete satisfaction.

SELECTED MACHINERY
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- AUTOMATICS
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- DRILLS
- GRINDERS
- JIG BORERS
- LATHES
- MILLING MACH
- PRESSES
- PLANERS
- SHAPERS
- MISCELLANEOUS

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LATHES

Lodge & Shipley 24" x 12', 12 spd. sel. gr. hd. 27½" swing.

Bridgeford 30" x 56', 15 spd. gr. hd. 38" swing 48" C.D., Mtrzd. carriage.

Monarch 20" x 72" centers model "M", 16 spd. gr. hd. 22½" swing. Monarch auto. sizing controls (late).

Niles-Bement-Pond 48" x 30' centers—quick change gr.—gr. hd., heavy duty AC motor drive—2 carriages—taper attachment—power rpd. traverse—16 spds. 2.04 to 90 RPM (late type).

Hendey 14" x 54" ctrs., 12 speed Gr. Hd. Toolroom Lathe. Swing 16½" (late type).

Sidney 20" x 12' MD QCG Bowl Head Lathe, MD. Swing 21", dist. between ctrs. 102".

Schumacher & Boye 30" x 12' QCG DBG MD—Swing 32½", centers 66", with Taper attachment, extra tool block.

Lodge & Shipley 24" x 21' Ctrs., 12-speed Gr. Hd.—MD — with two carriages.

Lodge & Shipley 24" x 19', 12-speed Gr. Hd., MD.—Swing 28", Centers 50".

TURRET LATHES

Gisholt No. 5 Ram Type Proselector Head Universal, late, hole through spindle 2 - 25/32", swing 19¾", max. turning length 27", bar feed, chucking, tooling.

Jones & Lamson No. 7A Saddle Type Hollow Hex. universal, late, hole through spindle 3", swing 21¼", max. turning length 36⅞", chucking, threading, tooling.

Warner & Swasey No. 3A Heavy Duty Saddle Type Hollow Hex. Universal — hole through spindle 4¾", swing 24½", max. turning length 44¼", bar feed, chucking, quantity of tooling.

Warner & Swasey #4 Pre-Selector Hd. Universal, swing 18⅛", max. turning length 29", bar feed & chucking—tooling (late).

Warner & Swasey #3A Universal, (late) 6" Hole in spindle, swing 24½", bar feed & chucking equipment.

MISCELLANEOUS

Gleason 3" M.D. Straight bevel gear generator (like new).

Norton #2 Hyd. Tool & Cutter Grinder (equivalent to new) 1945 machine.

Manville #250-C ¼" capacity DSSD Header.

Brown & Sharpe #4 capacity 1½" auto. Sc. Mchc.

Martin #12 MD Hydraulic marking machine (like new).

Toledo #50, 255 ton SS Dbl gr Press, 18" stroke bed 36" x 35".

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Botwinik Brothers of Mass. Inc.
3 SHERMAN ST. WORCESTER 1, MASS.

GRINDING WHEELS FOR TOOL & CUTTER GRINDERS

PLATE MOUNTED

Size 10" x 2" x 5"
Silicon Carbide—Grits 60-100-200—Hardness H & I

NEW—STANDARD MAKES

Price $10.00 each f.o.b. Los Angeles, Calif. 20% discount on orders for 50 or more.

EPCO—Dept. A
1527 E. Seventh Street
Los Angeles 21, California

LATE MODEL TOOLS

36"x36"x12' INGERSOLL Planer Type Miller. 3 heads. 40 HP AC Drive. Late Model.

4'9" AMERICAN "Hole Wizard" Radial.

18"x30" LODGE & SHIPLEY Selective Geared Head Engine Lathe.

NEW 250 Ton BLISS Knuckle Joint Press. M.D.

No. 2HS CINCINNATI Vertical High Speed Dial Type Miller.

Nos. 2K and 3H K&T Vertical Millers.

No. 2BL NATCO "Holesteel" Multiple Spindle Drill, rectangular head.

No. ½B P&W Two Spindle Reaming Machine.

Model W-7 BAUSH Hydraulic Multiple Spindle Drills.

No. 2 CINCINNATI Centerless Grinder.

20" G&E Industrial Shaper.

No. 4 W&S Ram Type Universal Turret Lathe.

No. 5 JONES & LAMSON Ram Type Universal Turret Lathes.

No. 3B B&S Dual Control Plain Miller.

No. 145 CLEVELAND Rigid Hobber.

No. 12 FELLOWS Gear Shaver.

WIGGLESWORTH MACHINERY COMPANY

230 Bent Street, Cambridge, Mass.

TEN TON CRANE

Shepard Niles Cab Controlled Crane, 10 ton capacity, 40' span, enclosed gearing, 230 volt DC, EXCELLENT CONDITION.
CAN BE SEEN IN OPERATION
PRICE $6,500.00

WINSTON MACHINERY COMPANY, INC.
517 South Delaware Street, Indianapolis 4, Indiana

FOR SALE

Threading Machine ⅜" Single Head Landis.
Turret Lathe South Bend 2 H—1⅝" spindle.
Turret Lathe Simmons #2—1¼" spindle.

All motor driven, excellent shape, used very little.

J. W. PITT, INC. BATH, N. Y.

Notice to Advertisers

Because of the Election Day Holiday the "Searchlight" pages of the

Nov. 13th Issue of

AMERICAN MACHINIST

Close for press earlier than the usual weekly closing time.

The cooperation of advertisers is solicited in forwarding new copy, or changes of copy, to reach us accordingly.

FINAL CLOSING TIME
Display and Undisplayed Ads
Friday, Oct. 27th

BORING MACHINES

3" Universal horizontal
3⅛" No. 32 Lucas horizontal
4½" No. 33 Lucas horizontal
5" Jones planer table type
24" & 30" Bullard vertical
52" King vertical
84" Gisholt vertical
100" NBP heavy vertical
Nos. 112B & 2112 Excello precision

BROACHES

2 ton American horizontal
No. 3 Lapointe, screw type
No. 3XA Oilgear horizontal
15 ton, 42" No. V3 Lapointe vertical
10 ton, 36" No. VA2-10-36 Colonial Surf.
15 ton, 36" American dual surf.
No. 1 Foote Burt dual surface

DRILLS

45 spdl. No. W7 Baush multiple
42 spdl. No. 816 Natco multiple
34 spdl. No. 30 Natco multiple
22 spdl. No. 14 Natco multiple
12 spdl. No. 39 Natco rail
6 spdl. Foote Burt No. 2 sensitive
Nos. 121, 217, 314A & 315 Baker
No. 30HO Baker (inverted)
21" & 24" Cincinnati
4' Cint. Bickford radial
6' Dreses radial

GEAR MACHINERY

Barber Colman:—Nos. 3 & 12, Types A & T
Gould & Eberhardt:—Nos. 8H, 12H, 16HS & 18H
Lees Bradner:—Nos. 1 & 5A
Fellows:—Nos. 6 & 7125A
Gleason:—3" spiral generator
Gleason:—18" Lappers & Testers
Red Ring:—12" shaver, 8" lappers
Fellows:—8M Red Line Checker
Cleveland:—No. 130 hobber

GRINDERS

Norton:—6"x18", 10"x18", 10"x36"
Landis:—6"x18", 10"x18", 10"x36" & 14"x 36"
B&S:—No. 1 Univ., No. 10 Elec. Hydr.
Heald:—12", 16" & 24" rotary surf.
Heald:—72A3, 72A5, 75A Internal
Bryant:—16A16, 16-28 & 24-36 Internal
Hanchett:—Nos. 228 & 230 opposed disc
Gardner:—15", No. 115 opposed disc
Blanchard—No. 10, 16 & 16A2 surface
Excello:—Nos. 33 & 35 thread
Keller:—No. R6 radius tool
Ingersoll:—30" milling cutter

LATHES

40"x88" centers Leblond
36"x108" centers Bridgeford
30"x100" centers Leblond
25"x48" centers Leblond
20"x45" centers Lodge & Shipley
18"x48" centers Hendey
18"x26" centers Lodge & Shipley
16"x78" centers American
16"x25" centers Sebastian
16"x36" centers South Bend
14"x36" centers Lodge & Shipley

MILLERS

No. 3V Van Norman vertical
No. 3 Kempsmith Maximil vertical
Nos. 3 & 4 Cincinnati vertical
Nos. 1-12, 1-18, 2-18 & 2-24 Cincinnati
Nos. 0-8 & 2-18 Cint. Rise & Fall
Nos. 1H—12" & 12-24 Kearney & Trecker
Nos. 3-24, 3-36, 34-36, 4-36, 4-48, 5-48, 56-72 & 56-90 Cincinnati Hydromatic
Nos. 1, 2 & 3 Kent Owens
Nos. 4, 6, 40 & CT36 Lees Bradner thd.
30", 42" & 84" Ingersoll rotary
No. 34-36 Cint. duplex hydromatic
24" No. 12 Brown & Sharpe Mfg.
Types C & D Hall planetary

SHAPERS & PLANERS

20", 24" & 28" G & E shapers
20" Gemco universal shaper
24" Columbia universal shaper
30"x24"x6' Liberty openside planer
36"x36"x8' Gray planer
48"x48"x12' Cleveland openside planer

MILES MACHINERY CO.
BOX 770 SAGINAW, MICHIGAN

UNUSUAL BUYS WITH GUARANTEED PERFORMANCE

BOLT CUTTERS

Acme 1", "Class A", right or left hand
Acme 3½", "Class A", right or left hand

BORING MILLS

Bullard 24", Vertical
King 54", Vertical, with turret head
Niles Bement Pond 36-44, Vert., turret hd & side hd.
Bullard 42", Vertical, two hds on cross rail
Cleveland #1, Horizontal, 2½" bar
Barnes #3, Horizontal, 3" bar
P & H Boar type, Horiz., 4" bar
Heald #44 Borematic, complete, NEW 1941

RADIAL DRILLS

American 5'14", Triple Purpose, Plain
Carlton 5'13"
American 5', Triple Purpose
Fosdick 5'14", Plain
American 7'16", Triple Purpose
Cincinnati Bickford 7'15", Plain
American 7'16", Triple Purpose, Plain

GRINDERS

Landis 14x36, Universal Grinder
Landis 26"x144", External
Landis 20x220, Plain Cylindrical
Landis 16x72, Plain Cylindrical
Brown & Sharpe #12, Plain
Landis 10x24, Type "C" Hydraulic Universal
Covel #91A Universal Tool Cutter Grinder
Heald #70A, Internal NEW 1941
Excello #31 L Precision Thread Grinder
Rivett #104—2 Internal Grinder NEW 1942
Hanchett #120, 30"x120" Plane Surface Grinder

LATHES

American 16"x6', High Duty
American 16"x8', 3 SCD, Bowl Head
American 18"x6', Geared Head
American 18"x8', Geared Head
American 18"x8', 3 SCD, Bowl Head
American 18"x10', Geared Head
American 24"x8', Geared Head
American 24"x10', Geared Head
American 24"x14', Geared Head
American 30"x12', Geared Head
American 30"x13', Geared Head
Hendey 14"x6', 3 SCD
Hendey 16"x6', 4 SCD, SBG, Yoke Head
Hendey 18"x8', 4 SCD
LeBlond #6 Multi Cut
LeBlond 14"x6', 4 SCD, SBG
LeBlond 17"x8', 3 SCD, DBG
LeBlond 21"x8', 3 SCD, DBG
LeBlond 24"x10', 3 SCD
LeBlond 25"x12', Heavy Duty, FIRST CLASS
LeBlond 27"x96" centers, NEW 1941
Lodge & Shipley 14"x36" centers
Lodge & Shipley 14"x5', 5 SCD, BG
Lodge & Shipley 14"x6', 3 SCD, DBG
Lodge & Shipley 16"x30" centers, NEW 1942
Lodge & Shipley 16"x8', Selective Geared Head
Lodge & Shipley 18"x6', Geared Head, Selective
Lodge & Shipley 18"x8', 5 SCD, SBG
Lodge & Shipley 18"x8', 3 SCD, DBG
Lodge & Shipley 18"x8', Selective Geared Head
Lodge & Shipley 18"x9', Bowl head type, 3 SCD
Lodge & Shipley 18"x10', Patent Head
Lodge & Shipley 20"x6', Geared Head
Lodge & Shipley 27"x18', Patent Head
Niles 30"x10' centers Timesaver

MISCELLANEOUS

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Avey #2, 2 spindle Drill Press, NEW 1941
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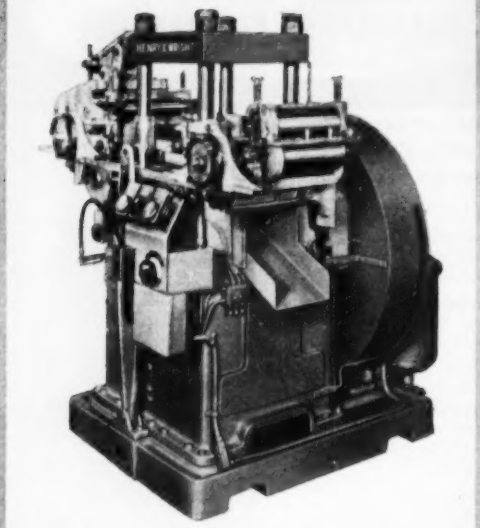

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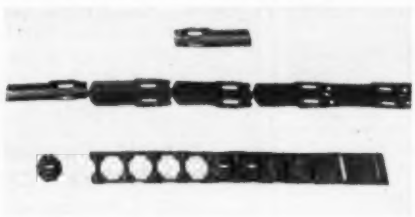

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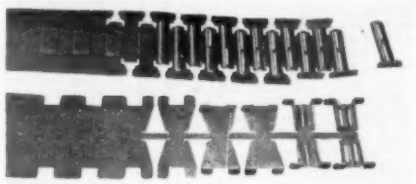

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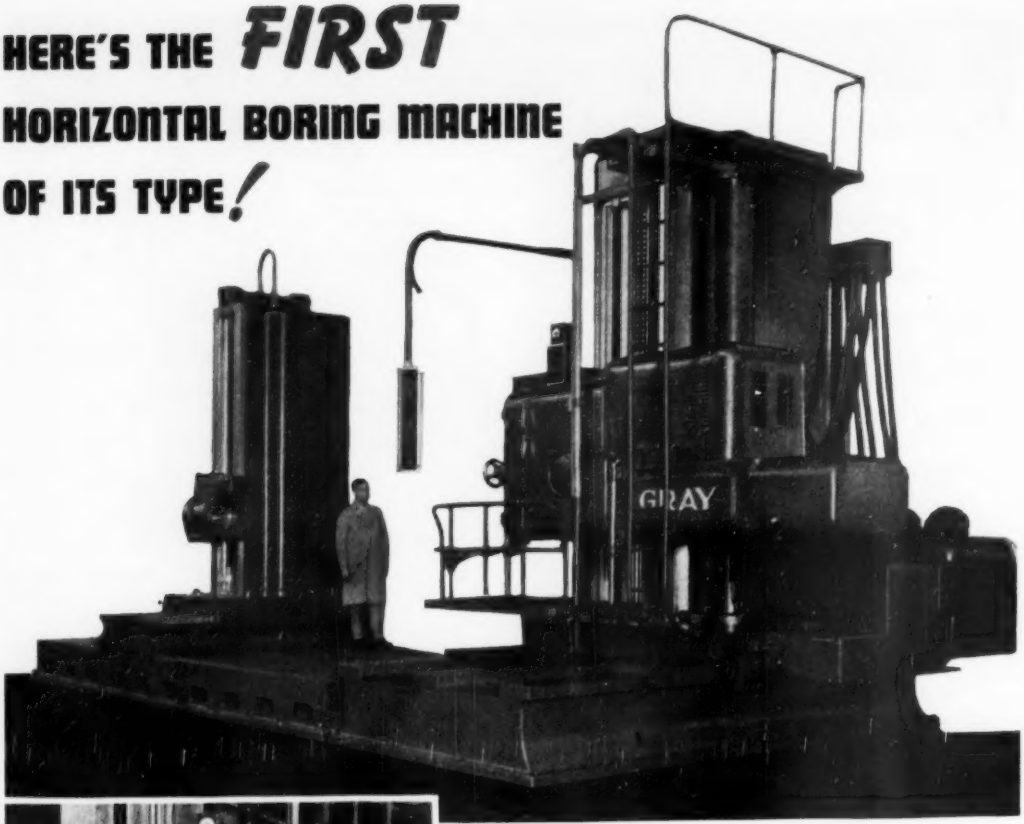

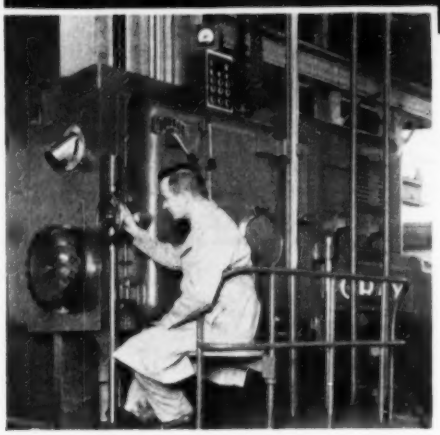

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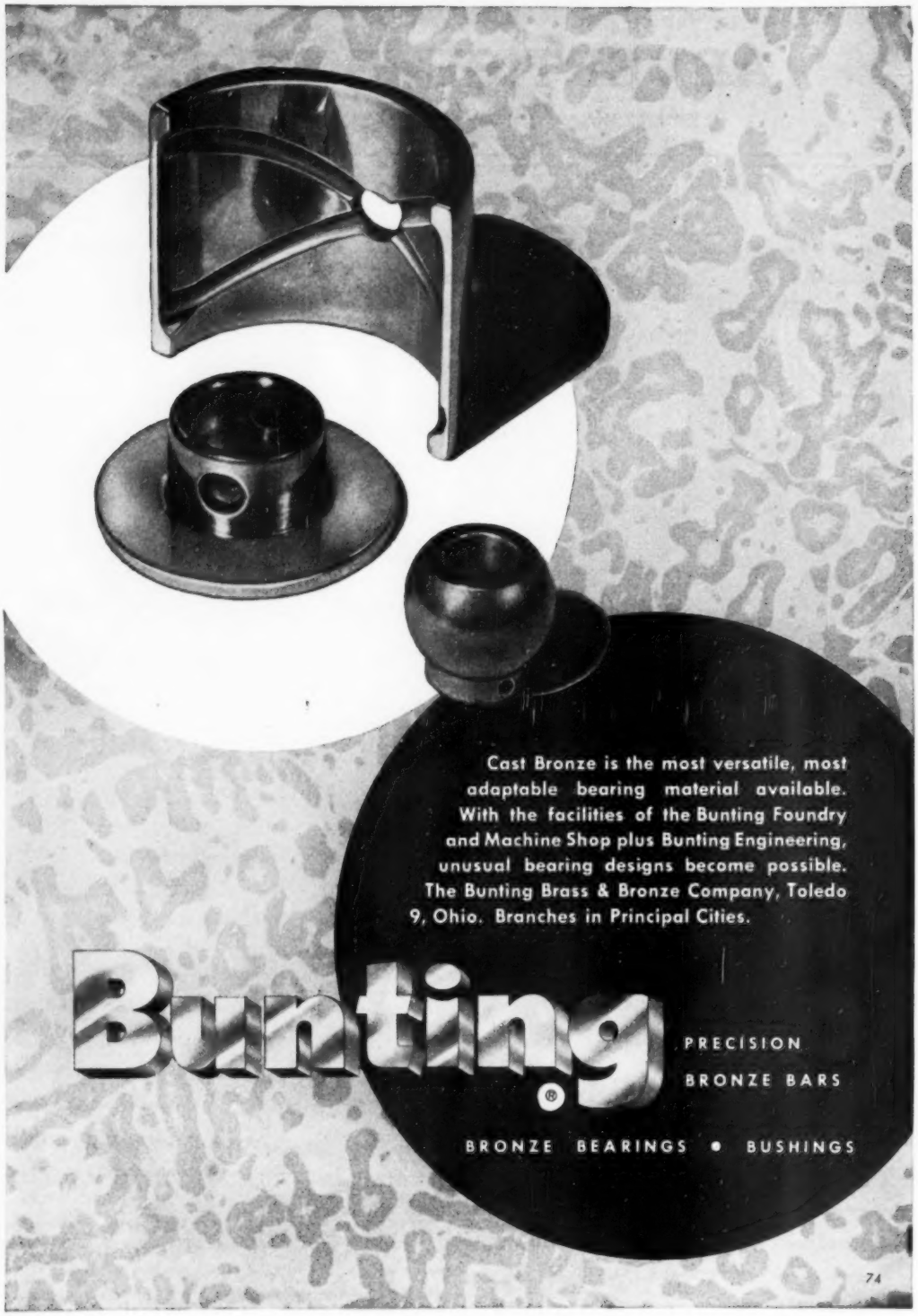
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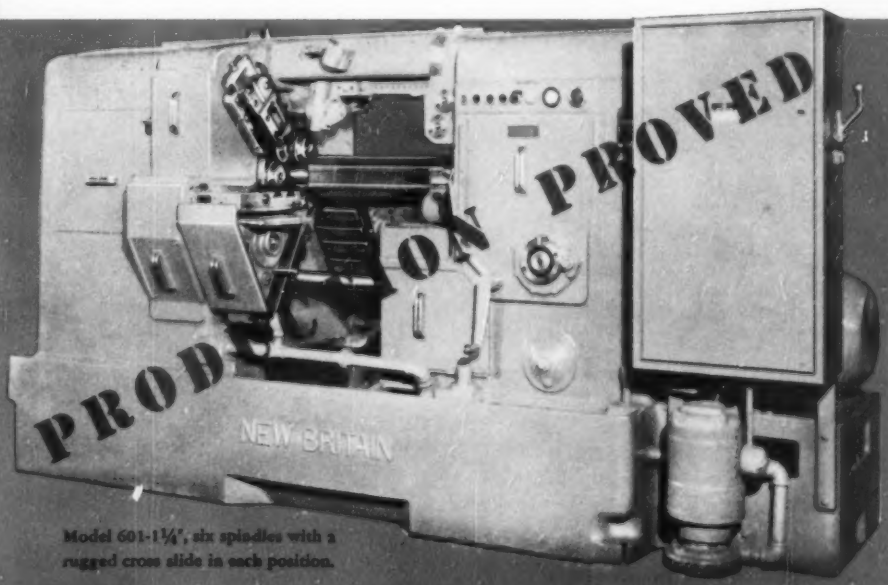

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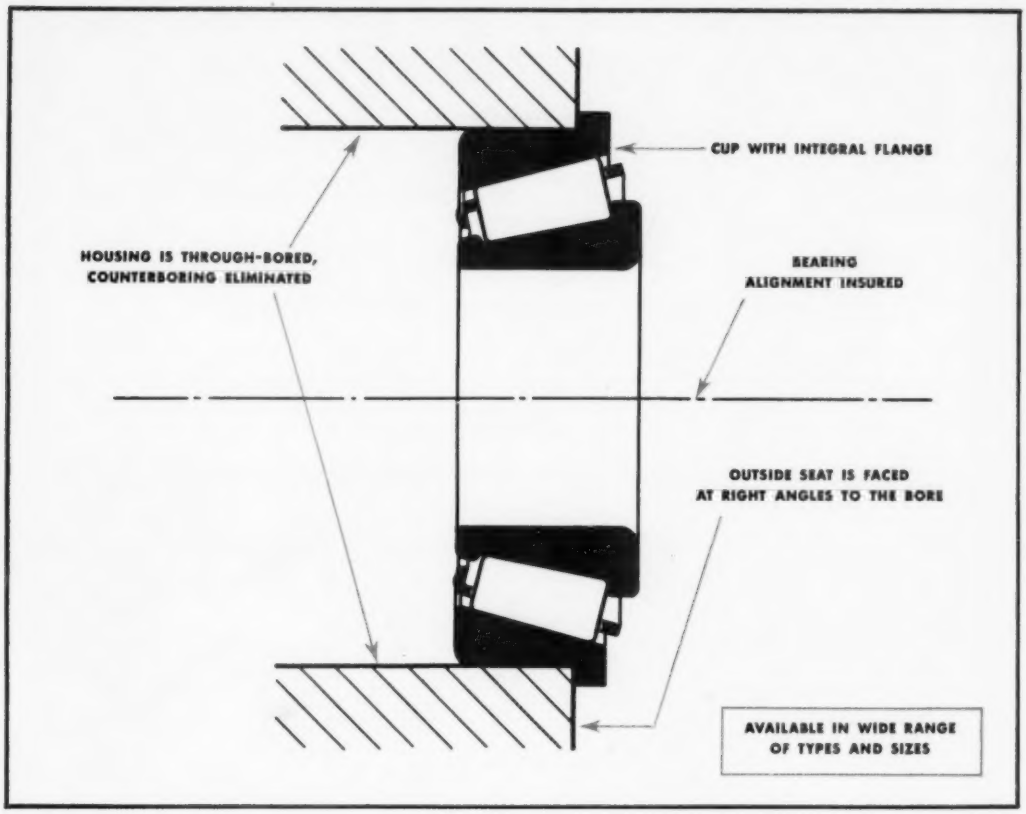
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